Digital flatbed cutter
G3 series

(M-1600, M-2500, L-2500, L-3200, XL-1600, XL-3200, 2XL-1600, 2XL-3200, 3XL-1600, 3XL-3200)

EN

Operating manual

ZÜND
swiss cutting systems

Translation of the original operating instructions

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Composition and publication	Zünd Systemtechnik AG

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Contents

1 Introduction 1
1.1 Foreword 1
1.2 Using the documentation 2
1.2.1 Structure of the operating manual 2
1.2.2 Symbols 3
1.3 Points to note when reading this operating manual 4
1.4 Care of the documentation 4
1.5 Current status of documentation 5
1.6 Standardisation, tests, marking 5
1.6.1 Standards 5
1.6.2 CE marking 5
1.6.3 UL testing 6
1.7 Legal notice 7
1.8 Troubleshooting, hints and tips 7
1.9 Documented cutter models 7
1.10 Publishing details 7

2 Product description 1
2.1 General 1
2.2 Product identification 2
2.2.1 Rating plate 2
2.2.2 UL marking 3
2.3 Intended use 3
2.4 Cutter - overview 4
2.5 Modules, tools 5
2.5.1 General 5
2.5.2 UM 5
2.5.2.1 Tools for the UM 6
2.5.3 RM-A 7
2.5.4 PUM 7
2.6 Material handling, options 8
2.6.1 Laser pointer settings 8
2.6.2 ICC camera 8
2.6.3 Cutter with static work surface 8
2.6.4 Cutter with conveyor 9
2.6.5 Sheet feeder options 9
2.7 Technical description 10
2.7.1 Complete machine 10
2.7.2 Schedule of work sequences 10
2.7.3 Complete machine 11
2.7.4 Movement system 12
2.7.5 Processing materials 13
2.8 Technical information 14
2.8.1 Dimensions and weights 14
2.8.1.1 Basic device 14
2.8.1.2 Cutter extension 16
2.8.2 Electrical connection, power consumption 17
2.8.3 Environmental conditions 17
2.8.4 Basic device compressed air 17

000017,02,12-2008, jmu

2.8.5 Control unit 18
2.8.6 Performance 19
2.8.7 Emissions 20
2.8.8 FCC approval 20

3 Safety 1
3.1 General 1
3.2 Proper use 2
3.3 Examples of improper use 2
3.4 Hazard warnings, important instructions 3
3.4.1 Explanation of the hazard warning 3
3.4.2 Structure of the hazard warnings 4
3.5 Areas of responsibility 5
3.6 Personnel requirements 5
3.7 Rules and safety at work 6
3.8 Procedure in case of malfunctions 6
3.9 Danger areas 7
3.9.1 General danger area 7
3.9.2 Danger area on the module carriage 8
3.9.3 Danger area during the installation 9
3.10 Working and traffic area 10
3.11 Safety signs 11
3.11.1 Responsibility of the operator 11
3.11.2 Position of the safety signs 11
3.12 Safety and monitoring devices 14
3.12.1 Protective system 15
3.12.2 Panel 15
3.12.3 Emergency stop switch 16
3.12.4 Safety cut-off feature 16
3.13 Personal protective equipment, clothing 17
3.14 Mechanical hazards 18
3.14.1 Gathering, retraction 18
3.14.2 Gathering, impacts of foreign objects 18
3.14.3 Cuts and stab wounds 19
3.15 Risk of burns 19
3.16 Electrical hazard 20
3.17 Risks arising from the emission of toxic dust 21
3.18 Risks arising from the processing of toxic/hazardous materials 21
3.19 Environmental hazard 22
3.20 Handling and storage of chemicals 23
3.21 Risk of fire and explosion 24
3.22 Danger caused by laser beam (laser pointer) 25
3.23 Safety instructions for operators 25
3.24 Safety precautions for service personnel 26
3.25 Disposal 26

4 Controls and operation 1
4.1 General 1
4.2 Safe working practices 1
4.3 Controls 2
4.3.1 Control panel 2
4.3.1.1 Operating unit 3
4.3.1.2 Navigation keys 4
4.3.1.3 Numerical keys 5
4.3.1.4 Function keys 6
4.3.1.5 Travel keys 7
4.3.1.6 Soft keys 8
4.3.1.7 Special keys, shortcuts 9
4.3.2 Emergency stop switch 10
4.3.3 Maintenance unit 12
4.3.4 Interfaces 13
4.4 Menu navigation 14
4.4.1 Menus and functions 14
4.4.2 Help 16
4.4.3 Info Menu 16
4.4.4 Popups/dialogues 16
4.4.5 User level 17
4.4.6 Function keys 18
4.5 Functions 19
4.5.1 Set language 19
4.5.2 Set display 19
4.5.3 Setting the volume of the signal 19
4.5.4 Delete data buffer 19
4.6 Operation 20
4.6.1 Daily checks prior to start-up 20
4.6.2 Start-up 21
4.6.3 Operating status 23
4.6.3.1 OFFLINE 24
4.6.3.2 STOPPED 25
4.6.3.3 ONLINE 26
4.6.4 Moving the bar/module manually 27
4.6.5 Tool handling 28
4.6.6 Modules/tools 31
4.6.6.1 General 31
4.6.6.2 Inserting/replacing the module 32
4.6.6.3 Tool (e.g. oscillating tool) 34
4.6.7 Connecting driven tools - allocating port 35
4.6.7.1 Connection - electrical tools (EOT, DRT, etc.) 36
4.6.7.2 Connect pneumatically driven tools 37
4.6.8 Activating the module 38
4.6.9 Tool positions 39
4.7 Material hold-down 40
4.7.1 Preparation 41
4.7.2 Defining/checking the vacuum range 42
4.7.3 Setting the strength 43
4.7.4 Switching on/off 43

4.8 Feeding options* 44
4.8.1 Feeding clamps 45
4.8.2 Feed guide rail 46
4.8.3 Feeding options 47
4.9 Automatic tool initialisation 48
4.9.1 Description 48
4.9.2 Setting the height 49
4.9.3 Initialisation 50
4.10 Laser pointer, reference point 51
4.10.1 Laser pointer settings 51
4.10.2 Reference point settings 52
4.10.3 Choose laser pointer as pointer type 53
4.10.4 Define reference point 53
4.11 Module carriage slot protective plate 54
4.12 Module and tool holder* 55
4.13 Switch off the machine 56

5 Description of menu 1
5.1 General 1
5.2 Menu structure 1
5.3 Description of menu 2

6 Malfunctions 1
6.1 Troubleshooting 1
6.2 Locate error 1
6.2.1 Error display 2
6.2.2 Error code 3
6.3 Error messages 4

7 Cleaning and maintenance 1
7.1 General 1
7.2 Safe maintenance of the machine 2
7.3 Operating resources 3
7.3.1 Handling operating materials 3
7.3.2 Cleaning fluids 4
7.3.3 Lubricants 4
7.3.4 Adhesives 4
7.4 Steps for maintenance 5
7.5 Lubrication diagram 8
7.6 Accessories case 8
7.7 Maintenance jobs 10
7.7.1 Service flaps and covers 10
7.7.2 Maintenance position 11
7.7.3 Visually inspect the machine for damage 11
7.7.4 Clean the machine 12
7.7.5 Clean X axis guide rails 13
7.7.6 Oil X axis guide bearings 15
7.7.7 Cleaning/oiling Y axis guide rails 19
7.7.8 Lubricating the Y axis bearing 21
7.7.9 Clean the chipping protection brush 22
7.7.10 Cleaning the feeding clamps/feed guide rail 23

7.7.11 Draining the maintenance unit condensation water 24
7.7.12 Automatic circuit breakers 25
7.7.13 Conveyor belt 27
7.7.13.1 Removing the conveyor belt 27
7.7.13.2 Remove the covers 28
7.7.13.3 Fitting a conveyor belt 29
7.8 Instructions for disposal 35
7.9 Starting up after periods at a standstill 35
7.9.1 Vacuum generator 1-9 KW/1-15 KW 35

8 Tools 1

9 Modules 1

10 Options 1

11 Material handling 1

12 Additional specifications 1

13 Documents 1

14 Glossary 1

000017,02,12-2008, jmu

1 Introduction

Zünd Systemtechnik AG
Altstätten, Switzerland

1.1 Foreword

Dear customer,

By purchasing our product you are participating in the worldwide success of Zünd cutter systems.

The modular design of our systems ensures:

- A system solution that is suited to your individual requirements in terms of speed and quality
- The availability of the most up-to-date technology thanks to constant developments

Our approach

Constant and intensive cooperation with successful users is a prerequisite for innovative and practical solutions. We are therefore grateful for any comments or suggestions on how we can improve.

Contact

Zünd Systemtechnik AG Industriestrasse 8 CH - 9450 Altstätten

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Fax	++41 71-757 8191
E-mail	info@zund.com
www	zund.com

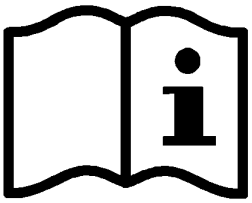
000009,04,02-2009, jmu

1.2 Using the documentation

The instruction handbook supplied is intended to help you to:

– Operate the machine safely
– Perform routine machine maintenance
– Use the machine optimally in all permitted areas

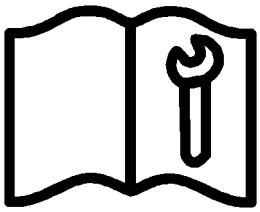
To do this, you need to be able to find what you want within the documentation.



The instruction handbook comprises:

Volume 1 - Operating manual

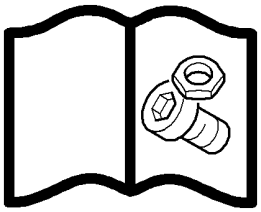
This volume contains information on the engineering, installation, operation and maintenance of the basic machine.



The technical documentation for the service personnel is contained in volumes 2 and 3:

Volume 2 - Service manual *

This volume contains information on the structure of the machine and on servicing by authorised service personnel



Volume 3 - Spare parts catalogue * (See Zünd homepage)

1.2.1 Structure of the operating manual

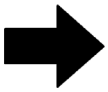
The operating manual consists of individual, consecutively numbered chapters. These sections are arranged according to the ring binder tabs.

The table of contents provides information on the structure of the individual chapters.

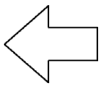
The numbers of pages and certain large graphics are prefixed with the number of the relevant chapter. Page number "2-10", for example, means the tenth page of chapter 2 "Product description".

1.2.2 Symbols

Illustration



Close, fix, tighten, in



Open, release, loosen, out

Higher

Lower

Text structuring

Task: Steps to perform

Result: Outcome of the tasks performed.

Prerequisites for performing a task

List of tools

Optional accessories

There are a number of optional accessories available for the machine. Any description relating to an optional accessory is identified in the operating manual by the * symbol.

000009,04,02-2009, jmu

1.3 Points to note when reading this operating manual

Text references

Chapter headings are numbered consecutively, with the first figure corresponding to the chapter number. Where reference is made to sections outside the current chapter, note the first figure and turn to the corresponding chapter, which contains the cited section. See chapter 2-4 "Overview of the machine", for example, leads to chapter 2 "Product description", which contains section 4 "Overview of the machine".

Sketches and schematic representations

These are provided for general information and do not necessarily correspond to the latest version of the machine.

Dimensional information

Dimensional information is listed in the SI/US unit system according to the place of installation.

1.4 Care of the documentation

Volume 1 "Instruction manual" must always be kept in close vicinity of the workstation.

Volume 2 "Service manual" must be made available to maintenance and service personnel when required.

1.5 Current status of documentation

Act accordingly to make sure that the documentation is complete and up-to-date at all times:

– Do not remove parts of the documentation
– Request copies of missing or illegible pages from the manufacturer, or download and print them from the Zünd homepage
– If any new documentation is delivered as a result of conversions taking place, file it away immediately
– If documentation is changed, file the new information and destroy the old
– If the documentation exists in more than one language, ensure that all languages are kept up-to-date

1.6 Standardisation, tests, marking

1.6.1 Standards

Scope of the documentation supplied

Volume 1: Operating manual

Volume 2: Service manual *

Volume 3: Spare parts catalogue *

Execution

This operating manual makes reference to the following standards:

- EN 62079
- EN 62023
- ANSI Z535-6
- EN ISO 12100-2

Important !

EU standards and guidelines which are applied are listed in the declaration of conformity.

In the interests of our customers, we reserve the right to make changes as a result of technical improvements. This document therefore corresponds to the technical status of the product supplied and not the manufacturer's current state of development.

1.6.2 CE marking

Within the EU, the cutter system is delivered with CE marking and an EC declaration of conformity according to Annex II A of the EC Machinery Directive 2006/42/EC (see chapter "Documents")

Important !

If the purchaser adds additional devices to the cutter system, or if the system is integrated into an larger system then the device is supplied with a "Declaration for the installation of an incomplete machine" according to Appendix II A of the EU

Machinery Directive 2006/42/EC and/or without CE marking. As a result, the declaration of conformity must be issued again by the purchaser.

1.6.3 UL testing

Zünd G3 cutters have been UL tested and comply with the ISO 60950 standard.

The certification can be accessed under UL number E176661.

1.7 Legal notice

The information contained in this publication is intended for information purposes only and is subject to change without notice at any time. This does not constitute an obligation on the part of Zünd Systemtechnik AG.

No part of this document may be copied, distributed, used or disclosed to third parties without express permission. Offenders will be liable for damages.

1.8 Troubleshooting, hints and tips

Important !

You can find information about troubleshooting and useful hints and tips on the Zünd homepage. (www.zund.com)

1.9 Documented cutter models

This documentation applies for the following types of G3 series cutters.

G3 Series				
M line	**L line**	**XL line**	**2XL line**	**3XL line**
M-1600	L-3200	XL-3200	2XL-3200	3XL-3200
M-2500	L-2500	XL-2500		
		XL-1600	2XL-1600	3XL-1600

1.10 Publishing details

Name

Operating manual for G3 series cutters, side-support version.

Composition, illustration and publication

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2 Product description

2.1 General

This chapter contains information on the following:

- Representational conventions in the operating manual
- Possible uses of the machine
- Structure of the main components
- Important technical data
- General technical description of the device

Directional information

Directions such as "right, left" or "forwards, backwards" are specified according to the operator's view of the machine during operation.

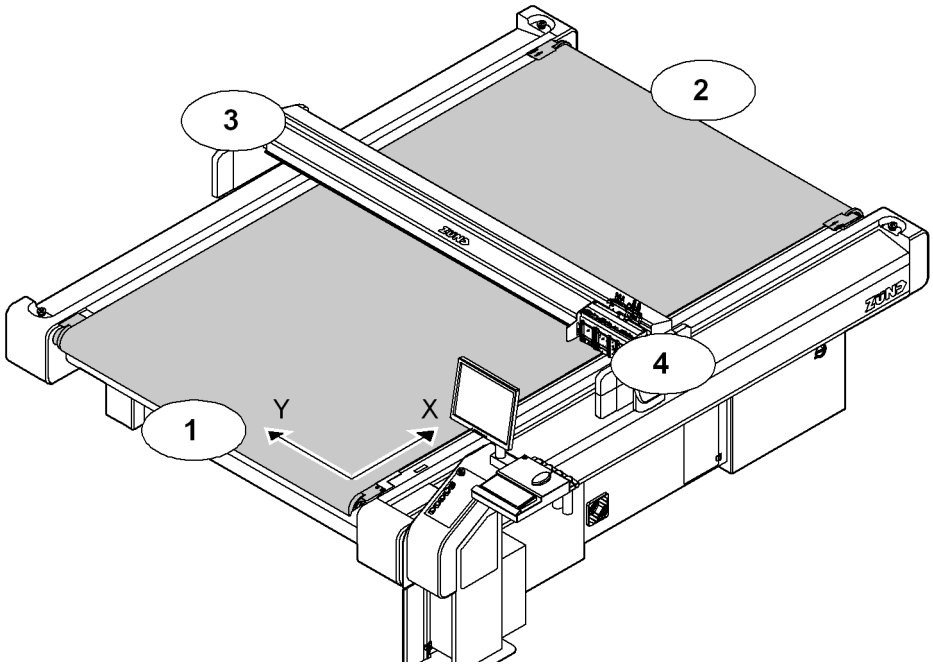

Fig. 2-1 Directional information

1	Front	**3**	Left
2	Back	**4**	Right
Y	Y axis	**X**	X axis

Important information

Important !

Refers to user tips and useful information which enhance the usability and prolong the service life of the machine and make the work significantly easier.

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2.2 Product identification

2.2.1 Rating plate

Important !

The rating plate is used to uniquely identify your machine.

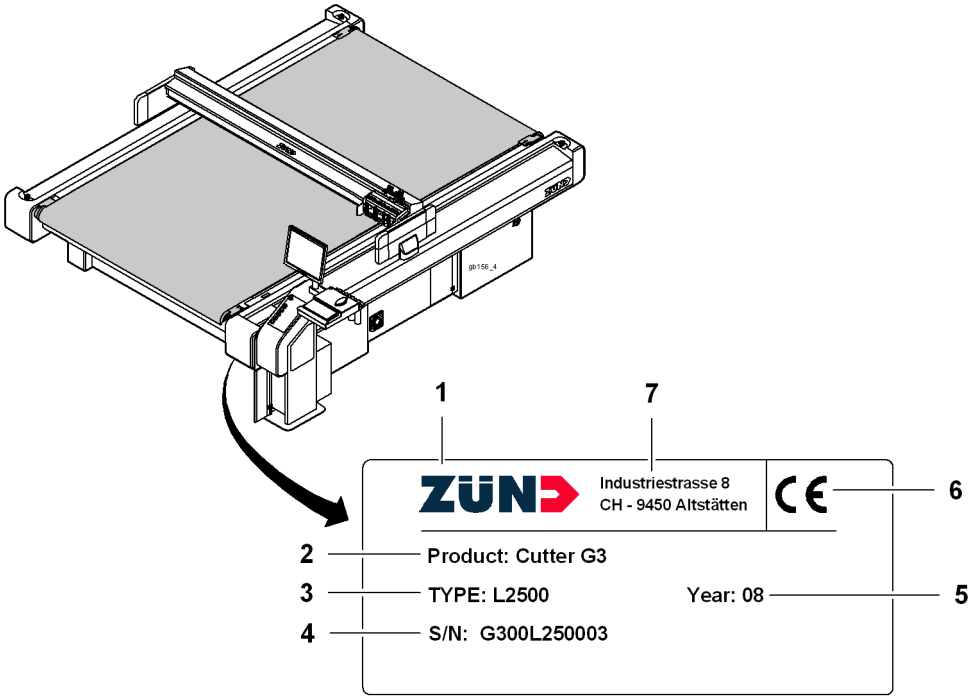

Fig. 2-2 Position of rating plate

1 Manufacturer
2 Product category
3 Device type
4 Serial number
5 Year of manufacture
6 CE marking [1]
7 Manufacturer's address

[1] see chapter "Introduction", "Standardisation, CE marking"

Structure of the serial number

Example: G300L250001

Serial number	Description
G3	Product
00L	Bar length
25	Table length
0001	Consecutive device number

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2.2.2 UL marking

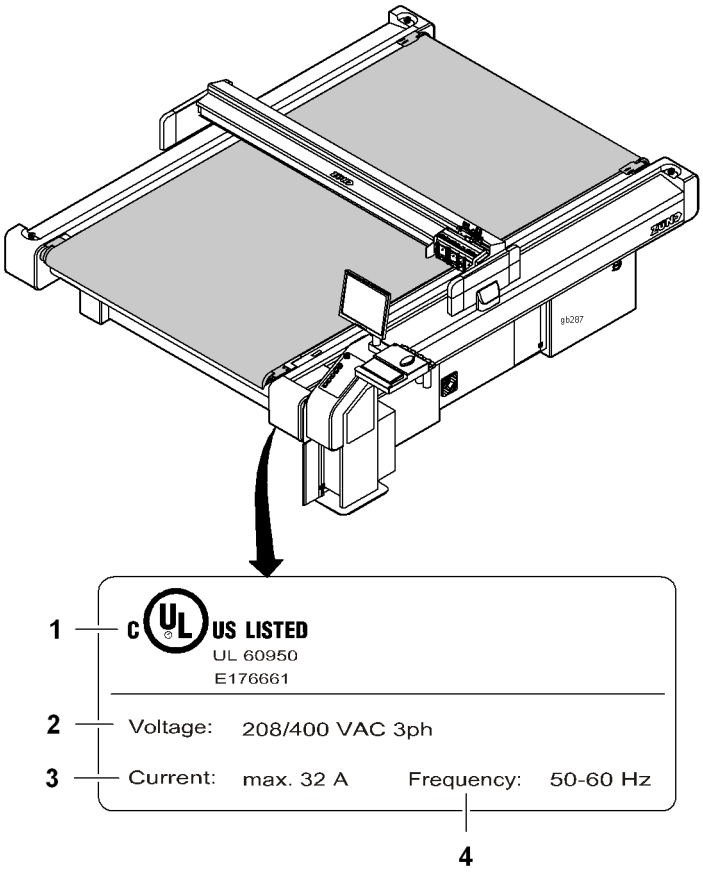

Fig. 2-3 UL marking

1 UL marking (Canada, USA)
2 Voltage range
3 Max. current
4 Frequency

2.3 Intended use

The cutter system can be used for the following purposes:

– As an output device for CAD/CAM data
– For processing and labelling materials arranged on the table

Aside from this, the intended use and the limits of the application are as follows:

– Depending on the tools and material feed system available,
– Described in the chapters "Tools", "Modules" and "Material transport".

2.4 Cutter - overview

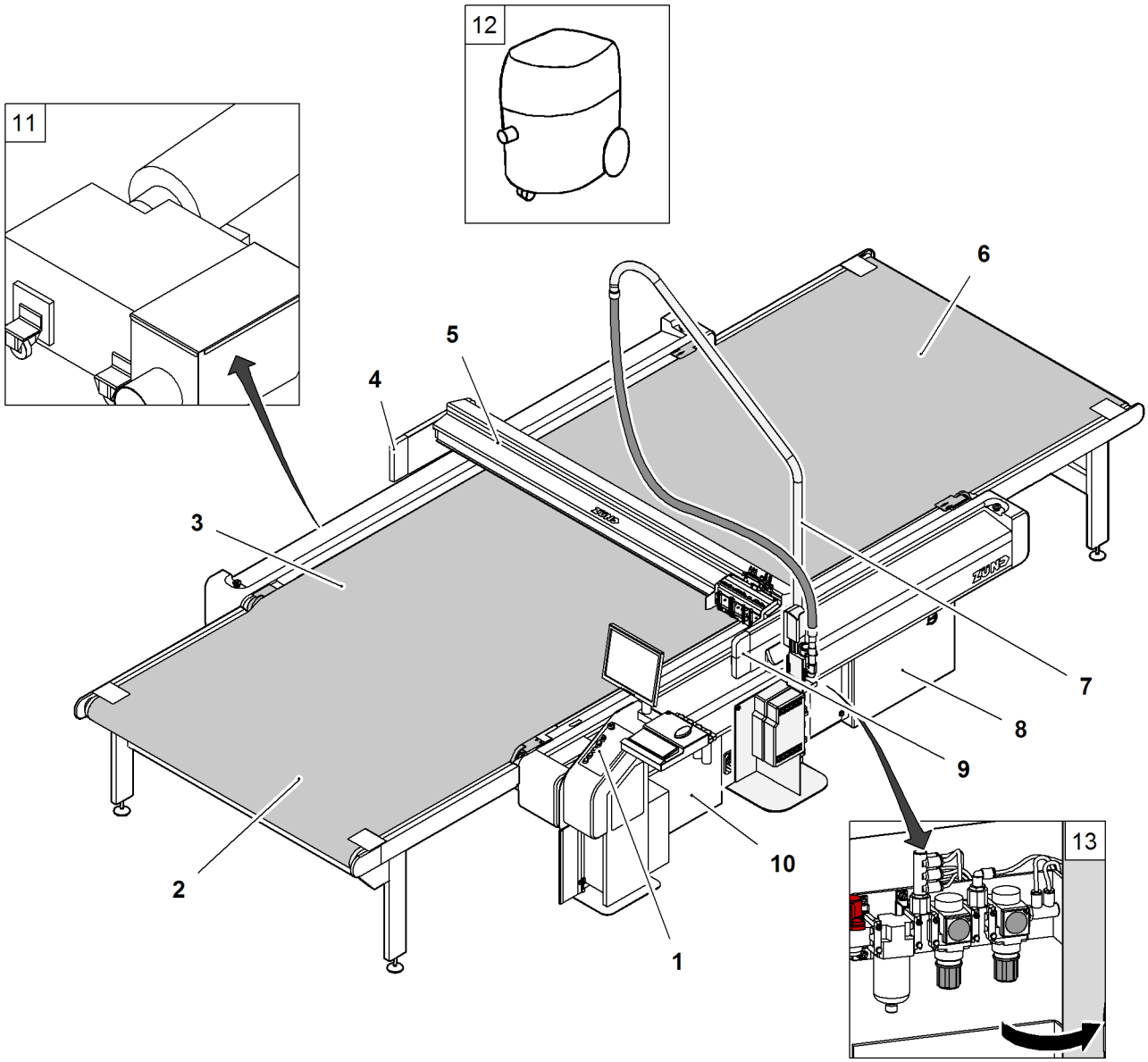

Fig. 2-4 Cutter - overview

1 Work station
2 Cutter extension, front
3 Table with vacuum
4 Left-hand safety device
5 Bar
6 Cutter extension, rear
7 Boom for router option
8 Power unit
9 Right-hand safety device
10 Electronics unit
11 Vacuum generator
12 Extractor (optional)
13 Maintenance unit (air pressure setting)

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2.5 Modules, tools

2.5.1 General

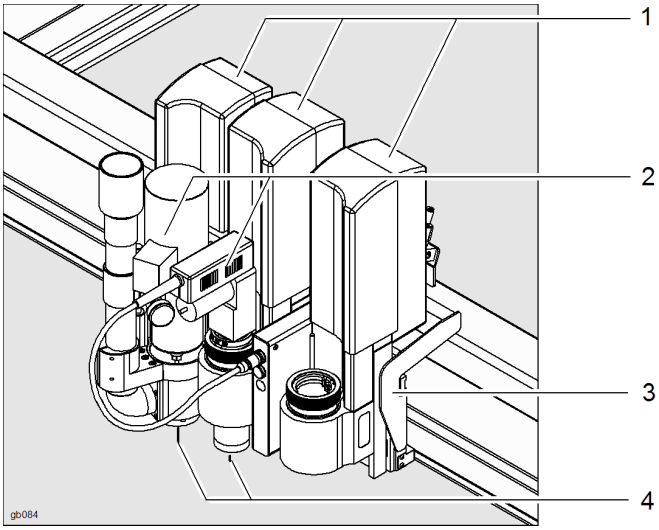


Fig. 2-5 Modules - tool inserts - tools

1 Modules (UM/RM/PUM)
2 Tools (EOT/POT/DRT)
3 Module carriage
4 Router/knife/...

Modules

The use of modules and tool inserts means that Zünd cutters can be highly specialised on the one hand, whilst still being able to be easily converted for processing other materials on the other hand.

As standard three modules can be fastened onto the module carriage.

Instructions on the operation of your module can be found in the chapter "Modules"/"Tool inserts".

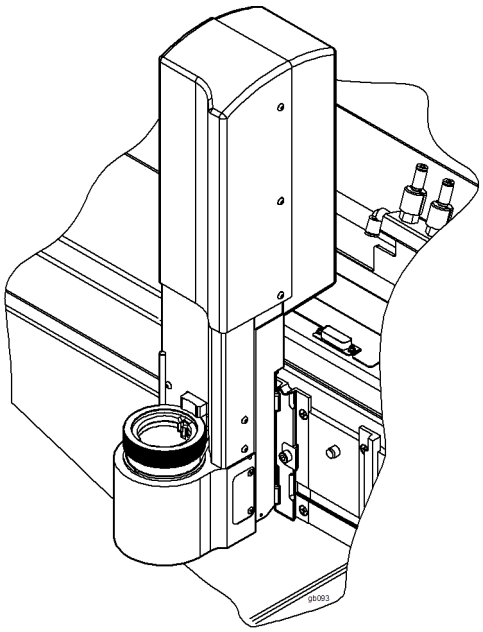
Tools

Zünd offers tools for processing the most wide ranging materials. A selection of important tool inserts can be found under the corresponding module.

On the Zünd homepage (www.zund.com) you can find all the current tool inserts or contact your Zünd partner for detailed information.

Instructions on the operation of your tool/module can be found in the chapter "Modules"/"Tools".

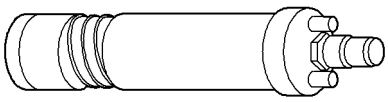
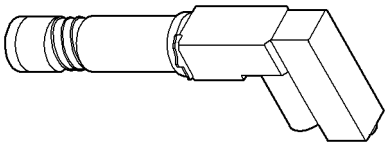
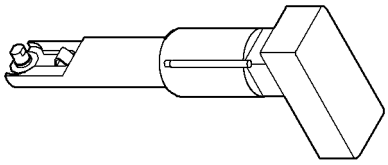
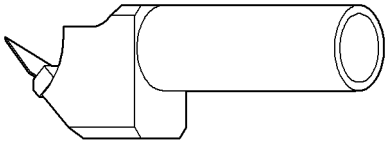
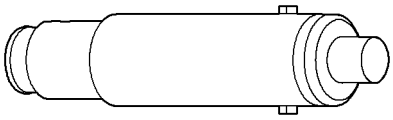
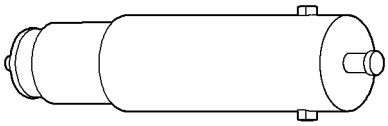
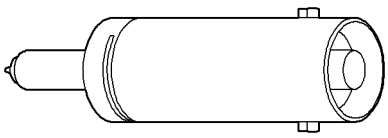
2.5.2 UM



Tangentially controlled high-performance module for the following tool inserts:

- POT
- EOT
- DRT
- Various insert sleeves and tool holders

2.5.2.1 Tools for the UM

	POT: Pneumatic oscillating tool for thick or tough materials such as foam, filling materials, thick leather, upholstery fabrics etc.
	EOT: Electrical oscillating tool for cutting soft to average toughness materials.
	DRT: Driven tool for rotating knives for cutting textiles, fibrous materials such as Kevlar, carbon
	VCT: Cutting tool for producing V-cuts
	UCT: Cutting tool which can be used universally
	KCT: Cutting tool for foils with and without mount material
	UDT: Marking tool

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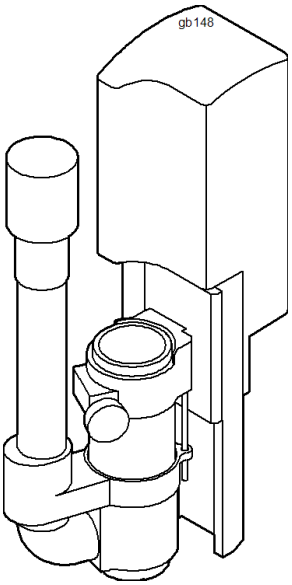
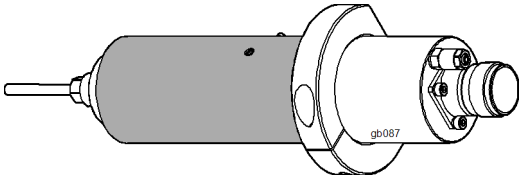
2.5.3 RM-A

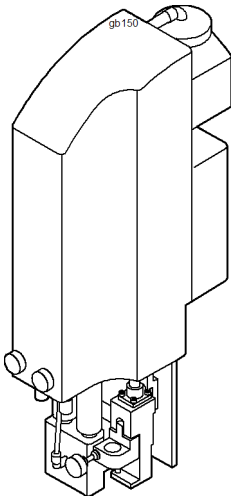


Router module for the use of 1000 W Zünd motor spindles.



Motor spindle with 1000 W for the processing of the most wide-ranging materials.

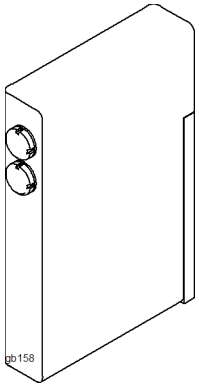
2.5.4 PUM



Punching and stamping module for the processing of leather materials.

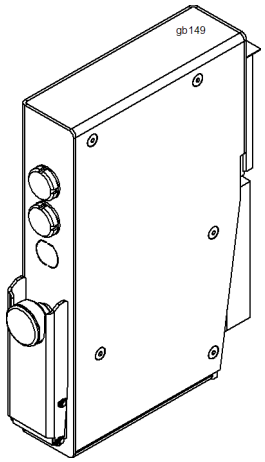
2.6 Material handling, options

2.6.1 Laser pointer settings



The laser pointer is used as an aid for the precise definition of the reference point

2.6.2 ICC camera



The ICC camera is used as an aid for importing the registration marks. The processing of the data is dependent on the communication software.

2.6.3 Cutter with static work surface

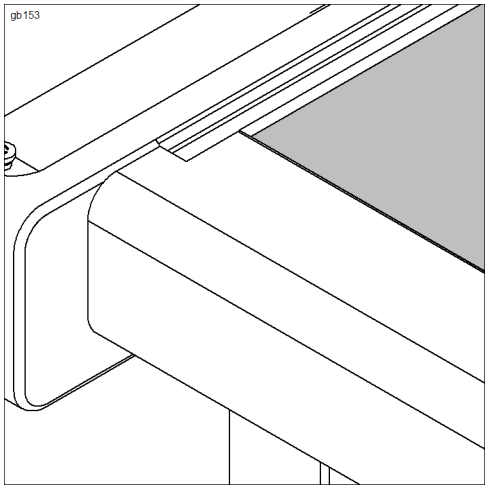


Fig. 2-6 Static work surface

The feeding and removal of the processing material takes place on the work surface of the cutter. The work surface is protected against damage using a cutting base.

2.6.4 Cutter with conveyor

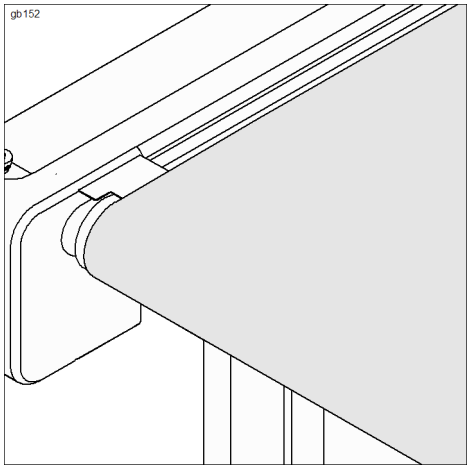


Fig. 2-7 Conveyor

Conveyor systems are used for pulling the materials to be worked with. The conveyor belt is used as a cutting base and conveyor belt at the same time.

During the processing, the material to be processed is fixed in place using a vacuum. After cutting, the bar moves backwards. The conveyor clamping elements fix the conveyor belt and the feeding clamps are pressed onto the material to be pushed forward. The bar tightens the conveyor belt to the set position.

The shape of the feeding clamps varies depending on the material to be worked with. An auxiliary drive is used in the case of larger tables or processing materials that are heavier for transportation.

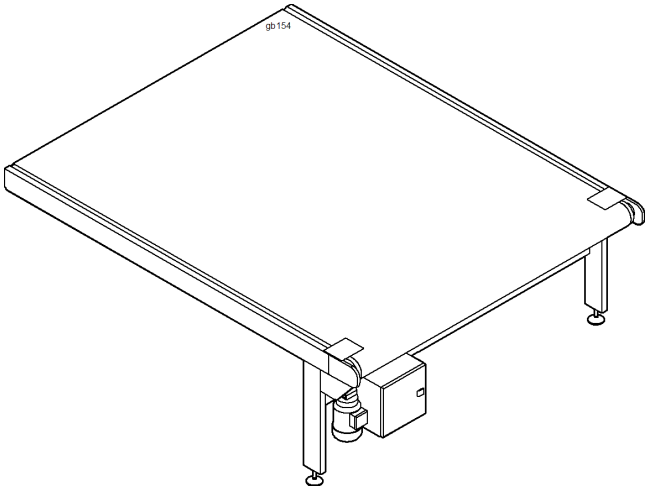
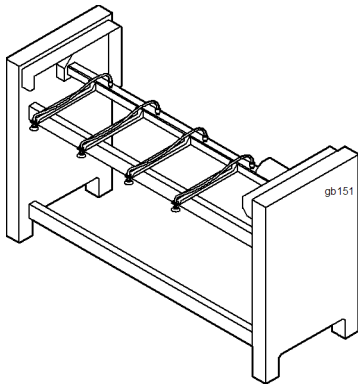


Fig. 2-8 Cutter extension

Cutter extensions guarantee efficient working. The material supply/removal is carried out while the cutter is completing its jobs. These extensions are available in different sizes, either with or without auxiliary drive.

2.6.5 Sheet feeder options



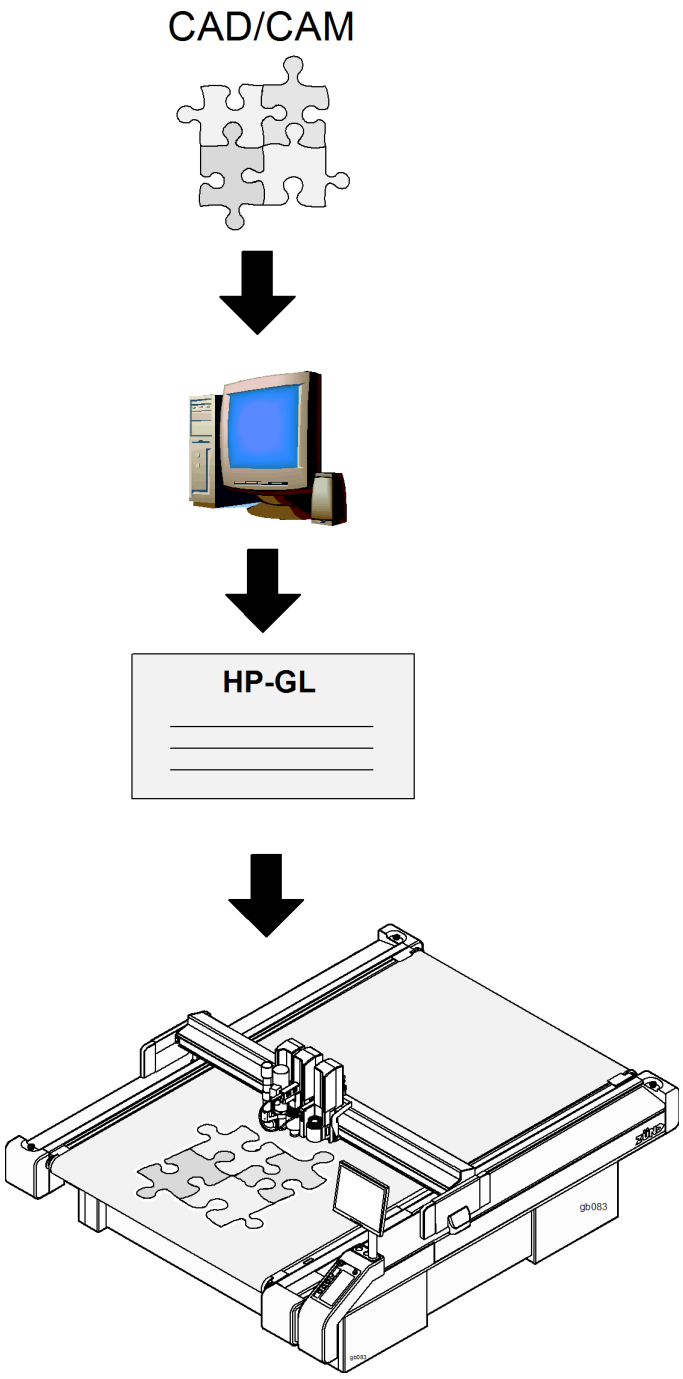
Fully-automatic sheet feeding

2.7 Technical description

2.7.1 Complete machine

The G3 cutter is a variable processing system for flexible and rigid materials with various tool systems. Extension options are available to provide improved handling and for the adjustment of the system to special requirements or for processing specific materials.

2.7.2 Schedule of work sequences



Starting point: CAD/CAM data

Communication software (e.g. Grafitroniks)

Sending the HP-GL data to the cutter

Processing the sent data

2.7.3 Complete machine

Table/vacuum plate

The work surface is designed as a perforated sheet. Vacuum zones are arranged under this perforated sheet which are connected to a high-performance vacuum generator via a distributor.

The vacuum is used for holding down and tightening the material to be processed. The cutter control permits sequential activation/deactivation of the individual vacuum zones and therefore reduces energy consumption. The vacuum generator (turbine vacuum generator, vacuum pump) automatically regulates the vacuum strength (100 mBar).

Electronics unit

The electronics unit is housed in the front right-hand side of the cutter and is only accessible for service personnel via a removable cover. The cutter control is housed in the electronics unit.

Power unit

The power unit is housed in the rear right-hand side of the cutter and is only accessible for service personnel via a removable cover. The power unit contains the power supply of the complete cutter and is activated/deactivated using an on/off switch. The connection of the individual consumers takes place using software control if required.

Pneumatics

Air pressure and air flow are adjusted for the respective consumer via a maintenance unit. The maintenance unit is accessible via a service door so that settings and maintenance work can be carried out.

2.7.4 Movement system

The G3 series has four electronically driven axes.

Axis	Function	Movement system
X	Bar	Drive via toothed belt/steel belt
	Material transport, material transport extension	Feed clamp elements, feeding clamps, auxiliary drive
Y	Movement of the module carriage	Drive via toothed belt/steel belt
Z	Height adjustment of the module	Example: Universal module, routing module
T	Rotary movement of the module	Example: Universal module

X axis - bar

The bar is driven by a motor via a toothed belt/gear mechanism and a toothed belt/ metal belt combination. The construction ensures that the function is backlash-free and it also minimises wear on the drive system. The bar is supplied with control signals and compressed air via an energy chain. All drive parts are protected against direct access/contamination using covers.

X axis - material transport

The material transport takes place via conveyor clamp elements and feed elements on the bar, which move the conveyor belt including the material to be used via the bar movement. In the case of large cutters, or cutters with material transport extension, an auxiliary drive is also used.

Y axis - module carriage

The module carriage is driven by a motor via a toothed belt/gear mechanism and a metal belt. The construction ensures that the function is backlash-free and it also minimises wear on the drive system. The module carriage is supplied with control signals and compressed air via an energy chain. All drive parts are protected against direct access/contamination using covers.

Z axis - height adjustment of the module

Machine-controlled setting of the processing height (e.g. universal module)

T axis - rotary movement of the module

Modules with integrated T axis (e.g. universal module)

2.7.5 Processing materials

The multitude of materials which can be processed with the different module and tool systems means that there is no single way to achieve the target.

However, the following factors always play an important role and must always be set/ selected for the specific material:

- Selection of the module and the tool insert
- Selection of the knife/router
- Descending speed, descending acceleration
- Cutting speed, acceleration

Contact your Zünd partner or the Zünd customer information centre for more precise information.

2.8 Technical information

2.8.1 Dimensions and weights

2.8.1.1 Basic device

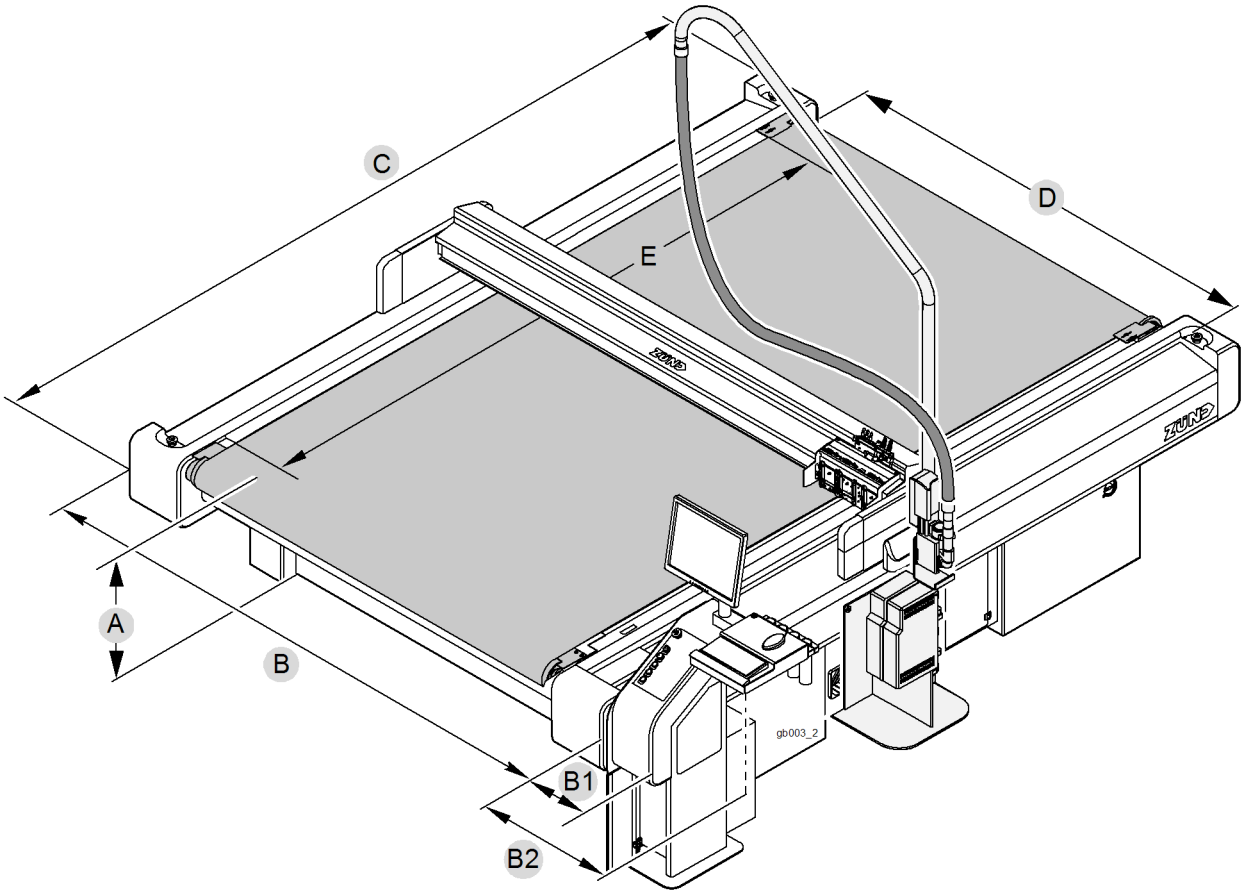


Fig. 2-9 Basic device dimensions

Type	Work surface [1] (D x E) [mm]	Overall dimensions (B x C) [mm]	Width B1 [mm]	Width B2 [mm]	Height Work surface (A) [mm]
M-1600	1330 x 1600	2055 x 2512	300	624	830
M-2500	1330 x 2500	2055 x 3412			
L-2500	1800 x 2500	2525 x 3412			
L-3200	1800 x 3200	2525 x 4112			
XL-1600	2270 x 1600	2995 x 2512			
XL-3200	2270 x 3200	2995 x 4112			
2XL-1600	2740 x 1600	3465 x 2512			
2XL-3200	2740 x 3200	3465 x 4112			
3XL-1600	3210 x 1600	3935 x 2512			
3XL-3200	3210 x 3200	3935 x 4112			

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Type	Static material clearance width [1] (D) [mm]	Material clearance width with CV (D) [mm]	Material clearance thickness [2][mm]
M-1600	1610	1330	61/31
M-2500	1610	1330	
L-2500	2080	1800	
L-3200	2080	1800	
XL-1600	2550	2270	
XL-3200	2550	2270	
2XL-1600	3020	2740	
2XL-3200	3020	2740	
3XL-1600	3490	3210	
3XL-3200	3490	3210	

[1] The work surface and material clearance width are dependent on the tool and the module

[2] Two versions are available

Type	Weight [kg]	max. floor load [kg/m^2]
M-1600	670	200
M-2500	840	
L-2500	970	
L-3200	1120	
XL-1600	890	
XL-3200	1290	
2XL-1600	980	
2XL-3200	1420	
3XL-1600	1120	
3XL-3200	1610	

Type	Max. weight processing material [kg]	Max. weight processing material [kg/m^2]
M-1600	-	55
M-2500	340	
L-2500	450	
L-3200	580	
XL-1600	370	
XL-3200	740	
2XL-1600	440	
2XL-3200	880	
3XL-1600	520	
3XL-3200	1040	

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2.8.1.2 *Cutter extension*

Important !

Cutter extensions do not increase the work surface of the cutter. They serve as a transport belt extension for the feeding and removal of material

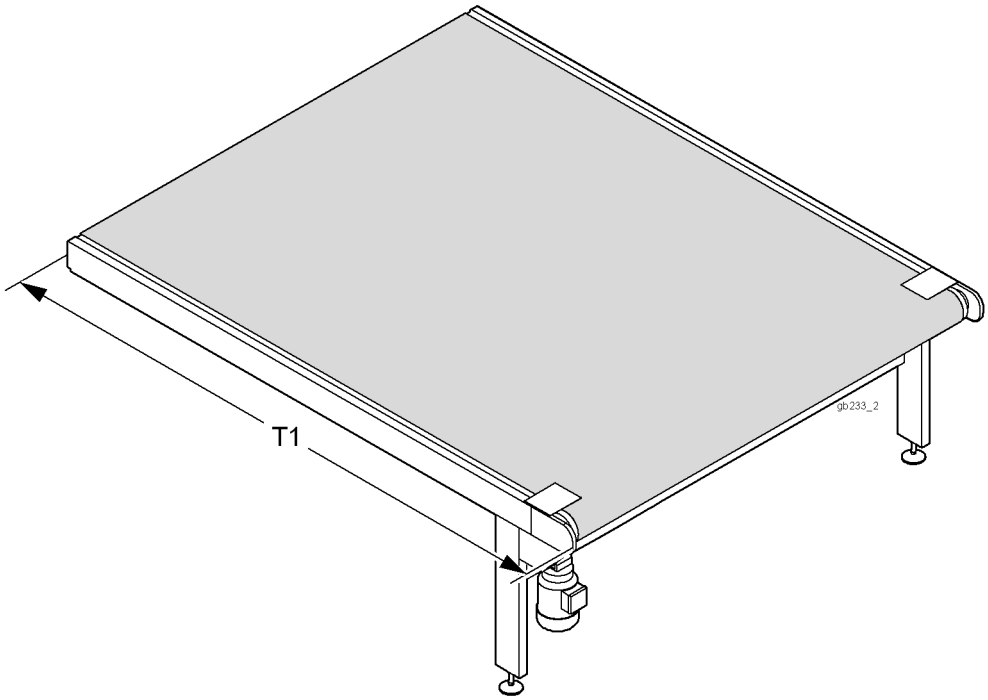

Fig. 2-10 Cutter extension dimensions

Type	Cutter extension T1 [mm]	M-1600	M-2500	L-2500	L-3200	XL-1600	XL-3200	2XL-1600	2XL-3200	3XL-1600	3XL-3200
CE0800	745	❍				❍		❍		❍	
CE1250	1195		❍	❍							
CE1600	1545	❍			❍	❍	❍	❍	❍	❍	❍
CE2500	2445		❍	❍							
CE3200	3145				❍		❍		❍		❍

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2.8.2 Electrical connection, power consumption

Electrical connection 400 V, 50/60 Hz

	Value	Units
Voltage	3-phase, 400 L1, L2, L3, N, PE	V
Mains frequency	50/60	Hz
Power consumption - 3 phases(without vacuum generator)	3.6	KW
Current consumption, 3 phases(without vacuum generator)	max. 12	A
Mains fuse, min.[1]	16	A

[1)] only applies for the basic device, the minimum requirement for the mains fuse increases depending on the vacuum generator

Vacuum generator

For additional data see rating plate/original operating manual in chapter "Additional specifications"

The vacuum generator is selected according to the following criteria:

– Cutter model
– Desired application
– Local mains voltage and frequency

Vacuum generator 1 - 9 KW	**Value**	**Units**
Voltage	3-phase, 400	V
Mains frequency	50/60	Hz
Power consumption - 3 phases	1 - 9	KW
Mains fuse, min.[1]	32	A
Vacuum generator 1 - 15 KW	**Value**	**Units**
Voltage	3-phase, 400	V
Mains frequency	50/60	Hz
Power consumption - 3 phases	1 - 15	KW
Mains fuse, min.[1]	32	A

2.8.3 Environmental conditions

	Value	Unit
Operating temperature	+ 10 to + 35	°C
Storage temperature	- 20 to + 55	°C
Relative humidity	10 - 80, non-condensing	%

2.8.4 Basic device compressed air

Conveyor feeding clamps	**Value**	**Units**
Operating pressure	0.6 - 0.8	MPa
Min. air flow	20	l/min

Conveyor feeding clamps	Value	Units
Setting - pressure regulator maintenance unit (P3)	0.6	MPa

Control of vacuum zones, supply of various modules, tools	Value	Units
Operating pressure	0.6 - 0.8	MPa
Min. air flow	20	l/min
Setting - pressure regulator maintenance unit (P2)	0.6	MPa

Additional specifications and requirements can be found in the chapters "Modules, tools, options, material handling"

2.8.5 Control unit

Execution

4-axis control (X, Y, T, Z)

Variable, prognostic vector processing.

Software

Command set	HP-GL, extended
Data format	ASCII

Interface

RS-232C / V24	600 - 38200 Baud

1 MB input buffer with replot function

2.8.6 Performance

Precision

	Value	Units
Resolution of measuring system	0.005	mm
Positioning accuracy at a constant temperature	± 0.1	mm
Repeat accuracy	± 0.03	mm
Evenness of the table	± 0.2	mm

Cutting performance

	Value	Units
Speed in the vector direction	1 - 1414	mm/s
Max acceleration in the vector direction[1]	9.1	m/s^2
Max. permitted printing force of the printhead (creasing)	200	N

[1] depending on the module equipment and cutter size

2.8.7 Emissions

Noise

Continuous sound pressure level of the cutter	< 75 dB (A)

Depending on the tool system and materials to be processed:

– if the limit value of 85 dB (A) is exceeded,

– noise protection measures may be necessary

Important !

Protective measures against noise and emissions (dust, solvents, material residues etc.) for each tool system are specified in chapter 3.

Electromagnetic emissions

The G3 series meets requirements of the following technical standards:

- EN 61000-6-2 EMC, interference resistance in industrial environments
- EN 61000-6-4 EMC, emission standard in industrial environments

Please ask the manufacturer if you wish to refer to the test reports.

2.8.8 FCC approval

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE:

Changes or modifications made by the user that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3 Safety

3.1 General

Your safety – as the operator, service engineer or otherwise – is the primary concern. Certain situations, problems or faults that may occur on the equipment could put your safety at risk if you are not aware of the steps you should take to avoid the resulting dangers.

Contents

- Stipulation of the correct use of the machine
- Generally applicable safety instructions and safety regulations to be observed
- Explanation of the meaning of symbols and pictograms which are used in this manual and in signs on the machine
- Location of safety and monitoring devices on the machine
- Information on protective equipment required and of requirements for operators and maintenance personnel

Specific activity-related and situation-related safety instructions are given in the corresponding procedures in the following chapters of this manual and in other parts of the documentation.

Latest technology

The supplied machine meets the standards of the latest technology at the time of delivery.

However, the equipment may pose dangers unless the safety instructions in this guide are observed and implemented.

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3.2 Proper use

The proper use of the machine is essential for its safe operation.

The equipment supplied:

- Is listed and labelled
- Determines the possible uses of the machine

The machine is intended for use as an output device for CAD/CAM data for the labelling and processing of materials arranged on the table.

The intended use and the limits of the application are dependent on:

- The module and tool system that is used
- The existing material transport system

Any other use or any use going beyond this scope constitutes improper use. The user bears sole liability for any damage arising as a result of improper use.

The operation of the machine is also seen as correct if:

- All nationally imposed safety regulations are complied with
- The safety instructions in this operating manual are observed
- The operating conditions are adhered to and the prescribed materials are used

3.3 Examples of improper use

Improper use of the machine can:

- Cause injury
- Result in serious damage to the machine
- Lead to loss of warranty

Improper use of the machine includes, among other things:

- Any structural modification to the machine carried out without written agreement from the manufacturer
- Use of unsuitable modules/tool inserts
- Servicing work performed by untrained or unauthorised personnel
- Installation of spare parts and use of accessories and resources not approved by the manufacturer
- Deliberate or careless interference with the machine during operation
- Commissioning of the machine
  - Without sufficient personal protection equipment
  - Without the designated protective and safety measures
  - If the operating manual is incomplete or not available in the local language
- Non-adherence to maintenance requirements
- Failure to react to signs of wear and damage

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3.4 Hazard warnings, important instructions

3.4.1 Explanation of the hazard warning

Both in the operating manual and on the device itself, dangers, important instructions and user tips are designated by special symbols and signal words as follows.

Danger !

The safety instruction Danger

- Refers to an immediate threat
- Refers to operational and service risks
- Warns of serious effects on health and safety, including life-threatening injuries.

Warning !

The safety instruction Warning

- Refers to a dangerous situation
- Refers to operational and service risks
- Warns of serious effects on health and safety, including life-threatening injuries.

Attention !

The safety instruction Caution

- Refers to a dangerous situation
- Refers to operational and service risks
- Warns of minor injuries and other serious damage to the machine and secondary damage

Attention !

The safety instruction Caution without a hazard symbol

- Refers to a dangerous situation
- Refers to operational and service risks
- Warns of serious damage to the equipment, damage to other property and consequential damage

Important !

Refers to user tips and useful information which enhance the usability and prolong the service life of the machine and make the work significantly easier.

3.4.2 Structure of the hazard warnings

Example:

Warning !

Risk of poisoning from the emission of toxic dust

Processing certain materials can lead to the creation of toxic dust with significant risk to health.

- Obtain information about the toxicity of the material to be processed from the manufacturer
- Use a suitable extraction unit or take other appropriate action accordingly

Hazard warnings consist of the following units:

1 The hazard symbol of the appropriate signal colour

2 The signal word corresponding to the danger resulting from the situation

3 The description of the danger

4 The description of the consequences which could result from this hazardous situation

5 Possible actions and codes of conduct to prevent the hazard occurring or to avert possible hazardous situations

3.5 Areas of responsibility

The manufacturer

- Is responsible for the safe condition of the machine on delivery, including instruction handbook and accessories, according to the sales documentation.

The owner or person authorised by him:

- Ensures that only adequately trained personnel, who have been properly instructed and have read and understood the content of the safety instructions in this chapter, will operate and maintain this machine
- Clearly determines the responsibility of the operators and service personnel as required in the instruction handbook
- Checks the personal protective equipment of operators and service personnel
- Is responsible for the safe condition of the machine
- Ensures that servicing and maintenance is carried out according to the maintenance schedule
- Notifies the manufacturer of any accident involving the machine that results in serious injury or substantial material damage
- Removes the machine from service immediately if defects arise that are detrimental to its operational safety

Operators and service personnel:

- Wear the necessary personal protective gear
- Halt operation immediately in the event of faults
- Report any changes which are detrimental to operational safety
- Keep the equipment clean
- Check the operation of the emergency stop switches before starting work

3.6 Personnel requirements

The operators and service personnel must meet the following requirements:

- Be physically and mentally suitable
- Be qualified by means of thorough training in the use of the machine
- Have read and understood the operating manual/service manual
- Be over the age of 16
- Have knowledge of first aid and the use of fire extinguishers

3.7 Rules and safety at work

- The operation of the machine is always subject to local regulations regarding safety at work and accident prevention.
- Before the machine is put into operation: Always check the safety equipment and protective covers.
- If a hazardous situation occurs, switch the machine from the ONLINE operating status to the STOPPED/OFFLINE operating status:
  - Switching can be carried out by pressing the ONLINE button on the operating unit
  - By pressing one or more direction keys (emergency stop function).
- You are not permitted to make unauthorised modifications and changes to the machine which might affect the system's safety. Accessories or spare parts produced by other manufacturers may only be used with the machine with the written approval of the manufacturer.
- Only service personnel authorised by the manufacturer are permitted to install, commission, maintain and repair the machine.
- Before carrying out any maintenance, repair and modification work:
  - Switch the machine off using the on/off switch and secure with a lock
  - Prevent the machine being switched on inadvertently by removing the mains supply cables to the distribution box (several mains connections).

3.8 Procedure in case of malfunctions

In principle, any troubleshooting work or inspection on the cutter is to be carried out only when it is switched off.

The following must never be by-passed or rendered ineffective:

- Light barriers and protective trip switches on the bar
- Monitoring sensors
- Safety and control switches in the machine

If malfunctions cannot be remedied by the operators using simple measures, then the responsible service station must be informed.

3.9 Danger areas

3.9.1 General danger area

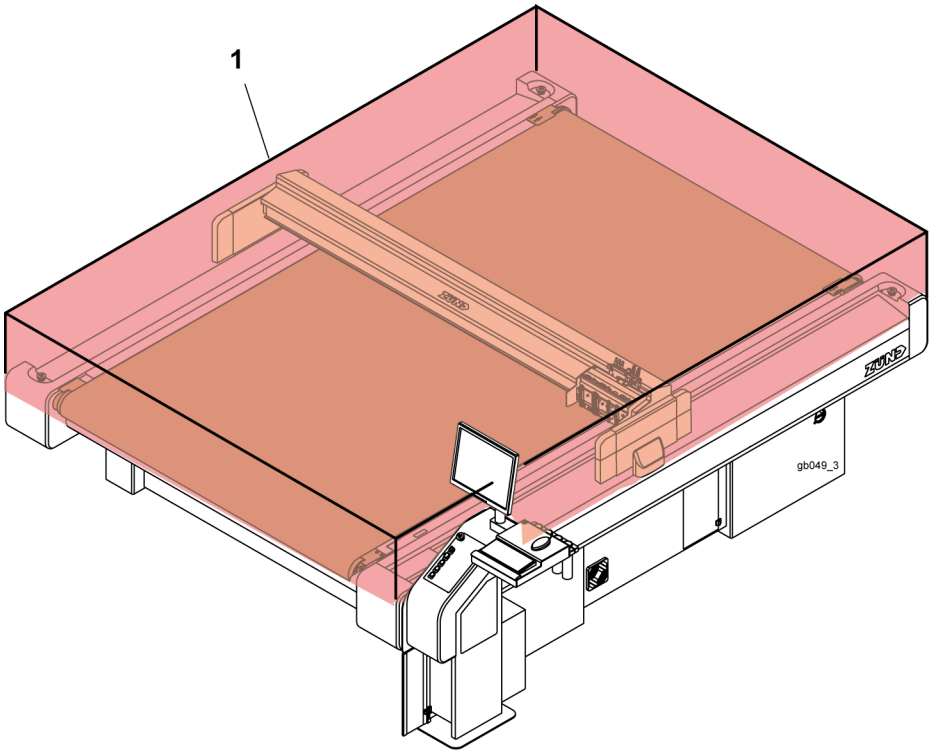

Fig. 3-1 General danger area

1 Danger area

3.9.2 Danger area on the module carriage

Attention !

Risk of injury on the module carriage

The danger area on the module carriage is not secured using safety devices.

- Do not reach into the danger area during the manual initialisation
- Secure the danger area on the module carriage using the slot protective plates

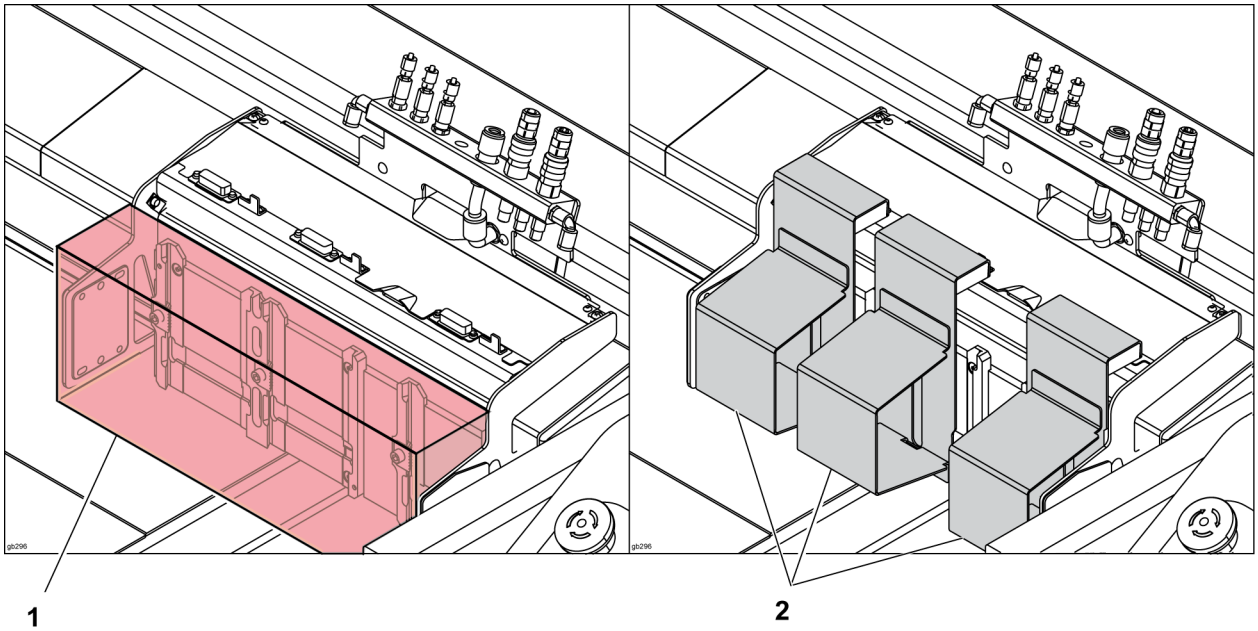

Fig. 3-2 Danger area on the module carriage

1 Danger area
2 Slot protective plate

Place a slot protective plate on each module slot on which no module is installed.

3.9.3 Danger area during the installation

Attention !

Risk of injury during the manual initialisation of the tool.

The safety devices are not active during the manual initialisation

- Do not reach into the danger area during the manual initialisation
- Use the automatic initialisation function for the initialisation

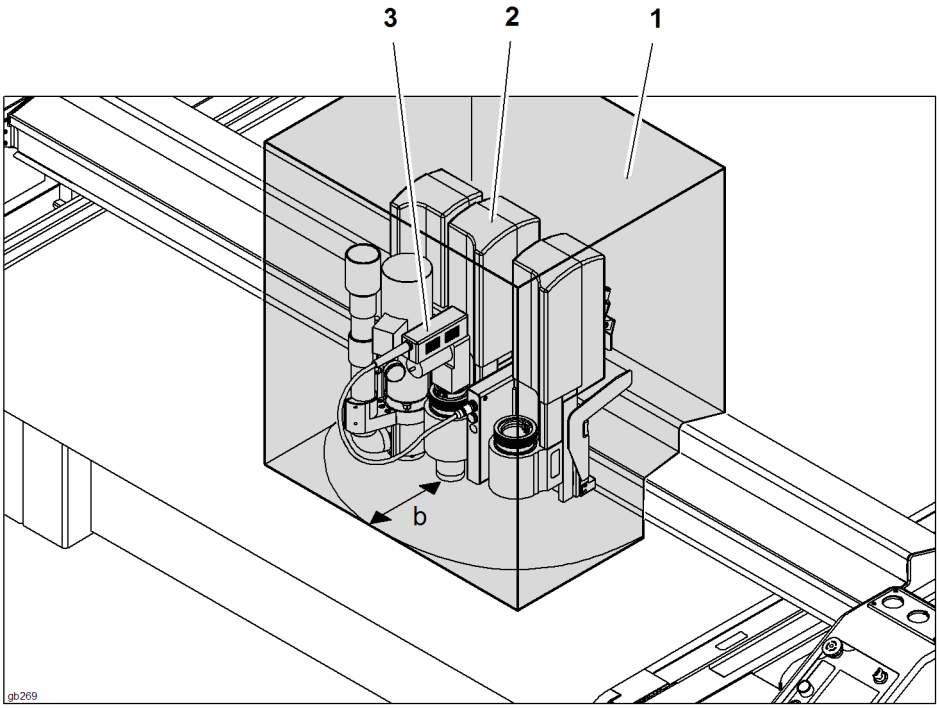

Fig. 3-3 Danger area during the installation

1	Danger area	**3**	Example: Module 2
2	Tool (e.g. EOT)	**b**	Safety distance

Safety distance during the manual initialisation

The safety distance (b) for operating personnel during manual initialisation is **25 cm**. Do not reach into the danger area during the initialisation phase.

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3.10 Working and traffic area

Warning !

There is a danger of injury to others through inappropriate behaviour or carelessness.

Please advise others to maintain an appropriate safety distance from the designated work and traffic zone.

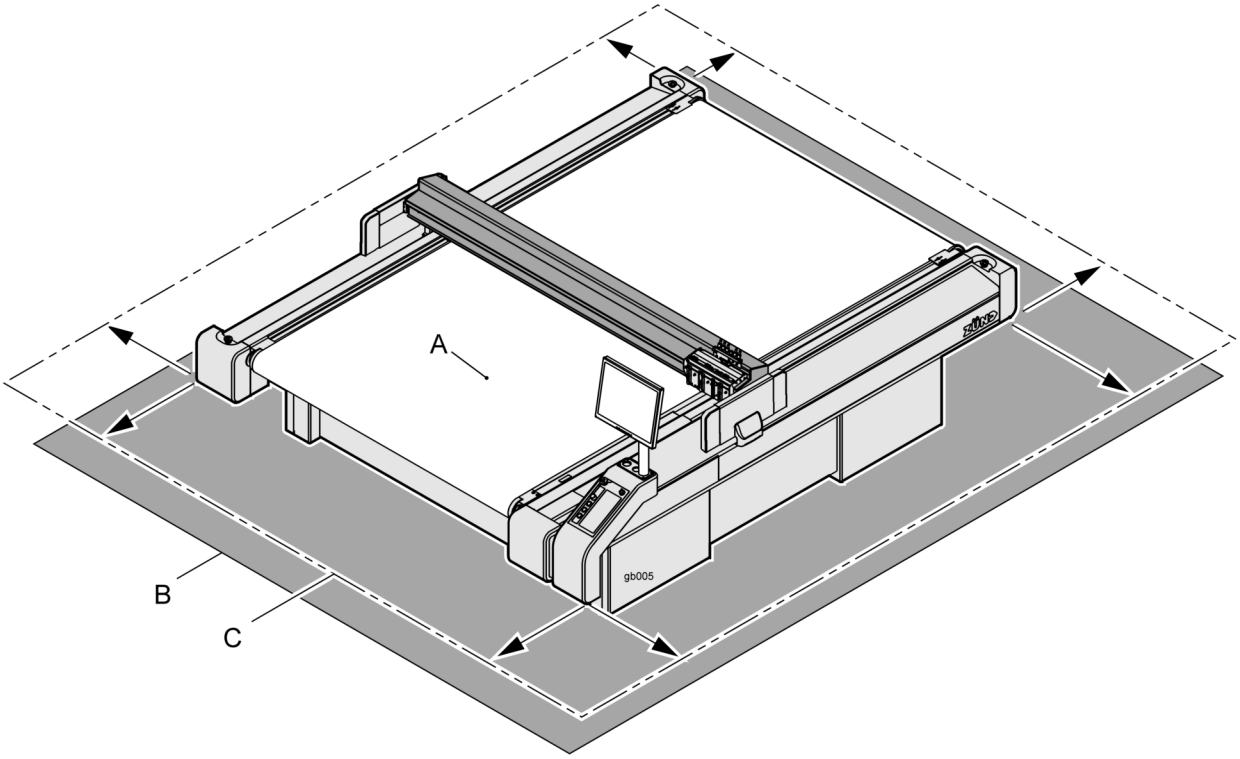

Fig. 3-4 Working area around the cutter

A Working area - active area of the tool

B Working and traffic area of the operator

C Minimum safety distance for other personnel

Safety distance for other personnel

The safety distance for other personnel extends over the surface of the cutter plus a distance of at least one metre.

Working and traffic area

The working and traffic area extends over the surface of the cutter with fittings and options plus a distance of at least one metre.

Use with conveyor extension

When using a cutter extension, the loading and removal of material is permitted outside of the danger zone (working and active area).

3.11 Safety signs

3.11.1 Responsibility of the operator

Warning !

Risk of injury due to a lack of safety signs

Risks and sources of danger cannot be localised due to the lack of safety signs.

- Replace missing or illegible safety signs as per Fig. 3-1

The operator is responsible for replacing missing/illegible safety signs on the machine. The appropriate safety signs can be requested from your service partner.

3.11.2 Position of the safety signs

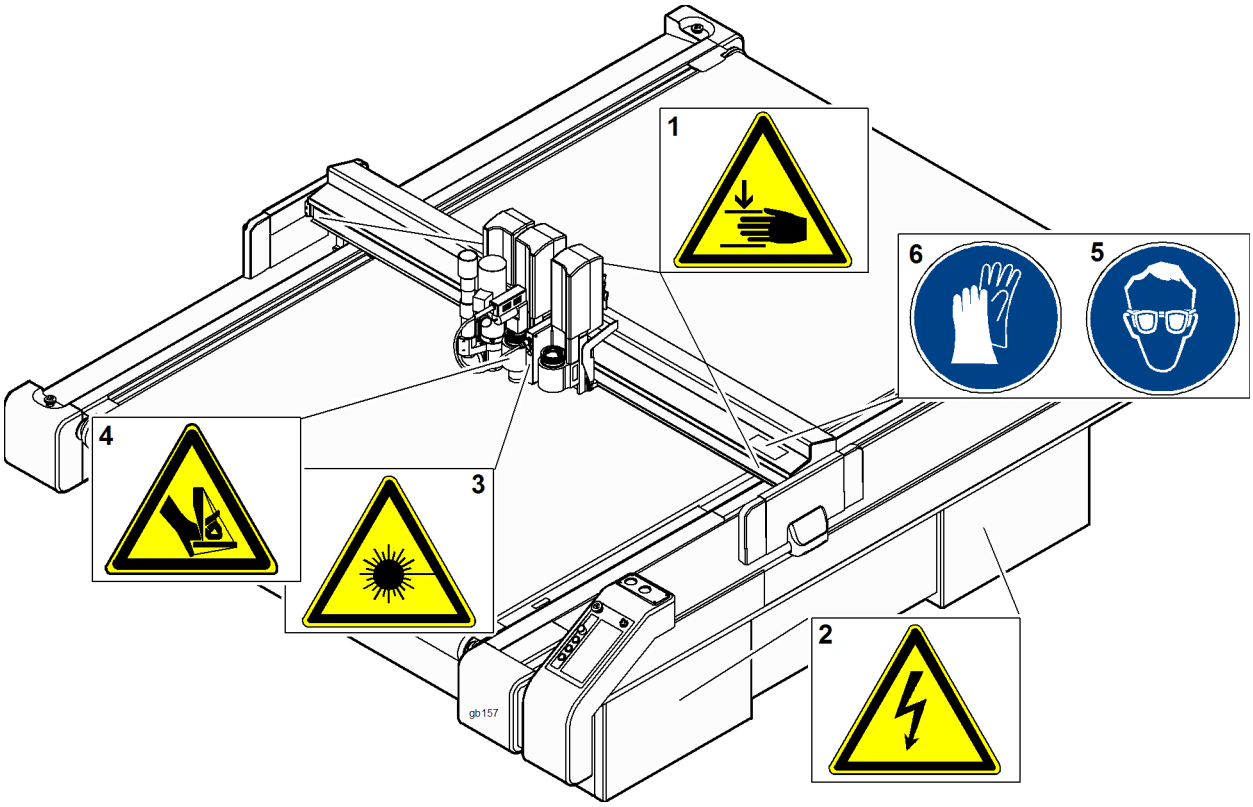

Fig. 3-5 Safety signs

1	Danger of hand injuries	**4**	Warning of the danger of cuts
2	Danger of electrical safety hazard	**5**	Wear eye protection
3	Laser beam warning	**6**	Wear protective gloves

Important safety signs on the machine must be followed. Otherwise, this could result in serious injuries or death. Special module or tool specific signs can be found in the relevant operating manual.

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Warning !

Safety risks due to missing or illegible safety signs.

Check all safety signs on a regular basis for legibility and completeness.

Replace missing or illegible safety signs promptly with new original signs.

Meaning of safety signs

The symbols on the safety signs

- have specific meanings
- are located wherever certain behaviour is prohibited due to it being potentially dangerous

Prohibition signs

- are round and red-coloured
- are located wherever certain behaviour is prohibited due to it being potentially dangerous

Order signs

- are blue and circular
- Stipulate the wearing of personal protective equipment to protect against hazards

Wear eye protection

Wear protective gloves

Fire protection signs

- are rectangular and red-coloured
- Are intended to draw attention to equipment and information for use in the event of a fire

Warning signs

- are triangular and yellow-coloured
- Are intended to draw attention to objects and circumstances which represent a potential danger to life and limb.

Danger of hand injuries (crushing)

Danger of hand injuries (severing)

Danger of electrical safety hazard

Laser beam warning

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3.12 Safety and monitoring devices

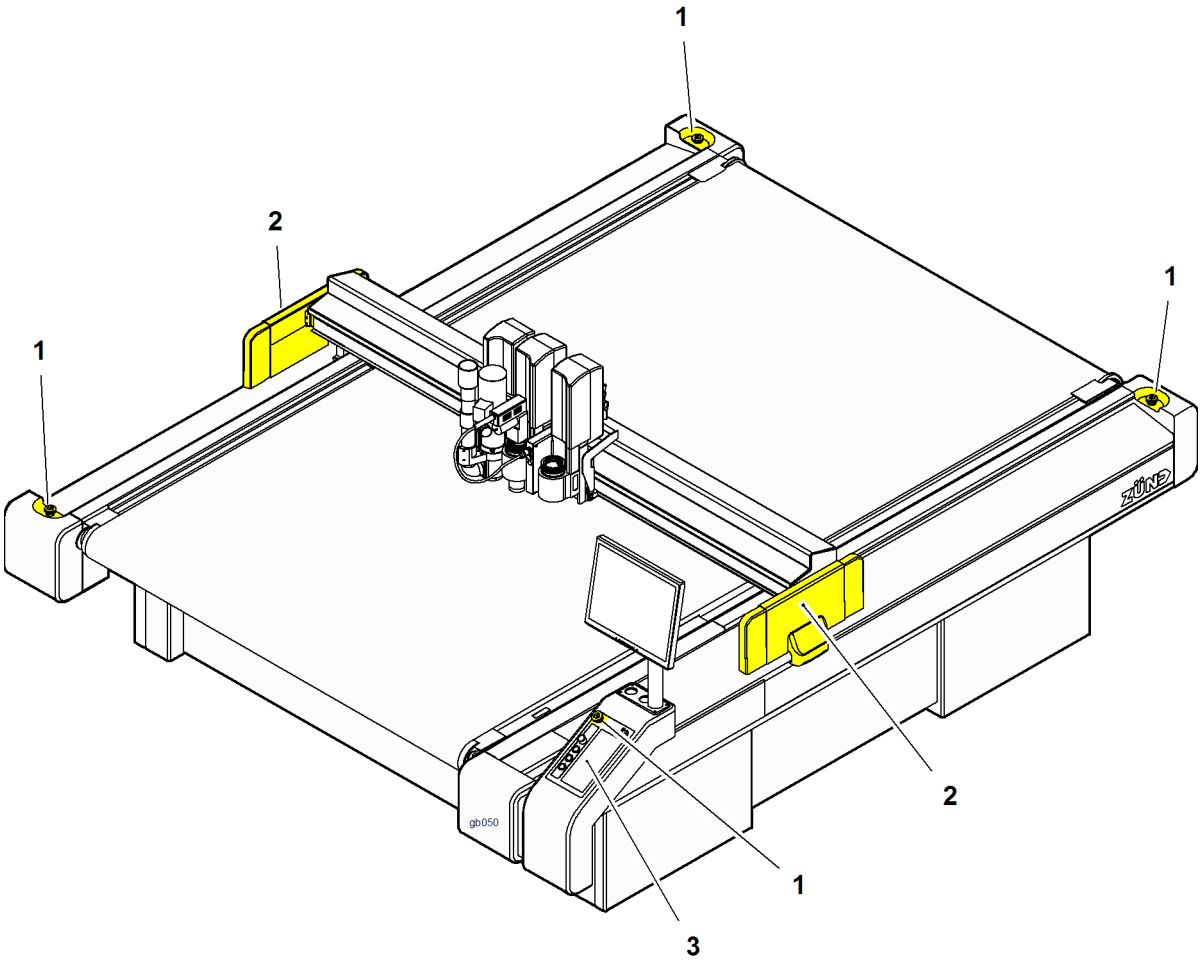

Fig. 3-6 Safety and monitoring devices

1 Emergency stop switch
2 Protective system
3 Panel

3.12.1 Protective system

Attention !

If there is a collision, the bar may cause serious injuries.

The high level of kinetic energy of the drive results in a braking distance which cannot be ignored.

Light barriers and safety cut-offs are no guarantee against injuries.

The protective system is made up of protective trip switches and light barriers on the ends of the bar.

Protective trip switches and light barriers are part of a self-monitoring safety shutdown system.

If protective trip switches or light barriers cause an obstruction then the following protective measures are introduced:

– An emergency stop halts all movements
– The operating status STOPPED is activated
– An error message is displayed

Protective trip switches

Protective trip switches trigger the safety shut-down if they are touched by an obstruction. They are used as hand protection.

Light barrier options

The working area is monitored by light barriers on the front and rear side of the beam.

Important !

The light barriers are active in all operating states.

3.12.2 Panel

Malfunctions are indicated on the LCD display.

An acoustic signal is emitted in the case of emergency stop and to acknowledge keypad entries.

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3.12.3 Emergency stop switch

– Emergency stop switches are part of a protective circuit
– They allow the machine to be turned off quickly in hazardous situations

Two emergency stop switches can optionally be fitted on the edges of the machine.

The mains power supply to the whole machine is switched off as soon as the emergency stop switch is pressed. The operating unit remains switched on.

Attention !

Pressing the emergency stop switch can damage the cutter.

Do not press the emergency stop switch to switch off the machine in routine operation.

Important !

To unlock an activated emergency stop switch after regaining operational safety, turn the switch anticlockwise (see chapter "Controls and operation").

3.12.4 Safety cut-off feature

The following safety measures are introduced when an overload occurs or an axle drive (T, X, Y, Z) is blocked:

– An emergency stop is carried out
– The cutter switches to the operating status STOPPED
– An error message and an alert buzzer indicate the safety cut-off

3.13 Personal protective equipment, clothing

The safety equipment required for operating the machine is dependent on the following factors:

– The module and tool system
– The material to be processed

When operating the machine or carrying out maintenance or servicing work, wear close-fitting clothing and the appropriate personal protective equipment.

Warning !

Risk of injury from being caught or trapped in moving machine parts.

- Do not wear loose clothing, scarves, open jackets or open shirt sleeves.
- Remove all jewellery before starting maintenance and servicing work.

Personal protective equipment comprises:

- Work clothes (service personnel),
- Protective goggles (operators, service personnel):
  – To provide protection from particles during cutting operations
  – To protect the eyes from dangerous radiation
  – To protect the eyes from chemicals
- Protective gloves where injury is possible due to:
  – Burns
  – Sharp or pointed objects
- Chemical-resistant protective gloves where injury is possible due to:
  – Chemicals (cleaning agents)
- Breathing protection when working with poisonous substances
- Ear protection if the continuous sound pressure level is over 80 dB.

Important !

You are personally responsible for:

- Using the required personal protective equipment
- Cleaning and maintaining the equipment on a regular basis
- Replacing damaged and unusable elements of protective equipment in a timely fashion

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3.14 Mechanical hazards

3.14.1 Gathering, retraction

Hazards caused by the bar, modules or the tool system during gathering and retraction

Possible consequences:

- Cuts, bruising and crushing of fingers and hands
- Bruising of head and arms
- Tearing out of hair
- Damage to clothing
- Damage to the machine

Precautions during the initialisation and the operation in the ONLINE operating status:

- Do not touch tool head and bar
- Do not enter the working/active area
- Do not touch table surface and material to be processed
- Do not lay your hands on side covers
- Do not lean over the working surface
- Avoid leaving long hair loose and wearing loose clothes and ties

These precautions specifically apply if the cutter can be switched into ONLINE operating status by the CAD/CAM system.

3.14.2 Gathering, impacts of foreign objects

Foreign objects on the table are grasped and pushed away by the bar and the tool head.

Possible consequences:

- Facial injuries and other injuries due to objects being pushed away
- Damage to the machine

Precautions during the initialisation and the operation in the ONLINE/OFFLINE operating status:

- Do not place materials, tools or other objects on the table or side covers
- Before operation, check whether there are any objects on the table or the side covers

3.14.3 Cuts and stab wounds

Knives, routers and punching inserts have very sharp edges which are sometimes hidden by moving equipment (slipper spring).

Possible consequences:

- Cuts and stab wounds to the hands and arms

Precautions during the knife change, initialisation and the operation in the ONLINE operating status of the machine:

- Be extremely careful when changing the tool inserts
- Do not enter the working area during the initialisation and during operation in the ONLINE operating status

3.15 Risk of burns

Certain materials (metals) and tools (router) reach very high temperatures during processing.

Possible consequences:

- Burns on the limbs

Precautions:

- Allow workpieces to cool before removing them
- Wear suitable protective gloves when removing workpieces that have just been processed
- Allow tools (router, knife) to cool before removing them

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3.16 Electrical hazard

Warning !

Risk of death or injury from electric shock.

The machine is operated with a mains voltage of 380 V, system frequency of 50/60 Hz.

Safety instructions

- Only trained service personnel are authorised to open switch boxes and electronics units.
- Ensure that mains cables are protected against mechanical loading and are laid so that they are free from strain.
- Replace damaged cables immediately.

3.17 Risks arising from the emission of toxic dust

Warning !

Risk of poisoning from the emission of toxic dust

Processing the most wide-ranging materials can lead to the creation of toxic dust with significant risk to health.

- Obtain information about the toxicity of the material to be processed from the manufacturer.
- Use a suitable extraction unit or take other appropriate action accordingly.

The company operating the system is responsible for making sure that all national regulations concerning the maximum permissible dust concentration at work are adhered to. When handling hazardous types of dust, all local safety regulations as well as the manufacturer's instructions must be observed. Use special vacuum cleaners with specially adjusted dust filters if you are routing/processing hazardous materials. Zünd offers suction systems which meet the following regulations as accessories:

– The extraction of hazardous dusts with a maximum concentration at work of up to 0.1 mg/m^3 and the extraction of wood dusts of dust class M
– The extraction of dusts conforming to dust class H

3.18 Risks arising from the processing of toxic/hazardous materials

Warning !

Risk of poisoning from emissions when processing toxic materials

Processing the most wide-ranging materials can lead to toxic emissions (gases, dust etc.) with significant risk to health.

- Never process toxic/hazardous materials!
- Obtain information from the **manufacturer of the material to be processed** about its toxicity.

Guidelines

- The company operating the system is responsible for establishing which processing materials are toxic/hazardous.
- It is prohibited to process toxic materials on Zünd cutters without appropriate additional safety measures!
- The company operating the system is responsible for installing appropriate additional safety measures!

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3.19 Environmental hazard

Warning !

Processing residues, operating fluids etc. can cause damage and pollute the environment if they enter the soil, watercourses or the sewage system.

Explanation of the hazard label

Hazard label for substances that are harmful to the environment

Safety regulations and protective measures

- Dispose of waste materials in accordance with current national environmental protection regulations. In case of doubt, check the appropriate disposal methods with your local collection point or recycling centre.
- Collect different chemicals in separate containers.

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3.20 Handling and storage of chemicals

Warning !

Cleaning agents, operating fluids etc., can cause skin irritation and can therefore be hazardous to health if handled carelessly.

Always wear personal protective equipment when working with chemicals.

Explanation of the hazard label

Hazard label for toxic substances

Hazard label for harmful substances

Hazard label for irritating substances

Important !

Chemicals classed as irritants are used to operate and clean this machine (cleaning agents, operating fluids). Safety datasheets of the substances in question can be downloaded from the Zünd homepage (www.Zund.com).

Safe handling of chemicals

Disposal !

Dispose of chemicals in accordance with national regulations.

- Store chemicals in tightly closed containers in a cool dry place (between 5 °C and 30 °C).
- Protect the containers from heat and direct sunlight.
- Provide good ventilation, including at floor level.
- Store chemicals in accordance with local regulations.
- Keep containers tightly closed.
- Use chemicals only for the intended purpose.

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3.21 Risk of fire and explosion

Warning !

There is a risk of fire when routing and cutting inflammable materials

Terminate the routing/cutting and leave the tool to cool in the case of

- Formation of smoke
- Discolourations on the router/knife which point to increased heat development

Warning !

Risk of dust explosions

Flying sparks or electrostatic charges result in the risk that there will be dust explosions during the extraction of different materials.

- Obtain information about the risk of explosion when processing the type of material that you are using.
- If necessary, adjust the extraction to the required regulations.

Fire classes

Refer to the following table to find out which type of fire extinguisher is used for each fire class:

A Solid materials, mainly organic in nature; e.g. wood, paper, textiles, etc.

B Liquid and liquefiable substances; e.g. petrol, oils, greases, paints, etc.

C Combustible gases: methane, propane, etc.

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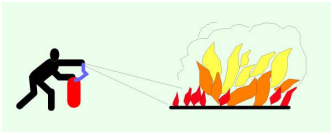
In the event of a fire:

- Switch off the machine (emergency stop switch)
- Assess the situation: If the situation is dangerous, leave the area immediately and call the fire brigade. Only try to extinguish the fire if your personal safety is not at risk.
- Remove a suitable fire extinguisher (A, B, C) from its bracket and prepare it for use.



- Locate the source of the fire. Attack the fire with repeated short bursts from the extinguisher. Always spray the extinguishing agent into the source of the fire. In other words, always aim at the burning material and not at the flames.
- After using the fire extinguisher, do not return it to its usual place but have it re-filled immediately.

Observe the following safety rules and countermeasures

- Find out the number of locations where fire extinguishers are kept and familiarise yourself with their use. The adjacent sign indicates the location of a fire extinguisher.
- Do not use inflammable cleaning agents to clean the machine.
- Store all processing materials in the proper manner in accordance with local guidelines.

3.22 Danger caused by laser beam (laser pointer)

Class 2 lasers are used as laser pointers. Momentary irradiation of the eyes, as can occur if you accidentally look directly at the laser, is not dangerous. In addition, depending on the construction, the laser beam is targeted directly at the material to be processed.

Safety instructions

- Avoid direct, prolonged eye contact

3.23 Safety instructions for operators

This instruction manual cannot cover all possible situations and potential hazards.

It is therefore particularly important that operators

- have been thoroughly trained and are aware of and able to correctly assess the hazards that can arise from the machine
- are familiar with all safety devices on the machine
- request information from the manufacturer without delay if an undocumented, hazardous situation arises in connection with the machine

In addition to these safety instructions, you must also observe the situation-related safety notes in the chapters "Controls and operation" and "Maintenance and cleaning".

3.24 Safety precautions for service personnel

The reliability, readiness and service life of the machine greatly depend on you carrying out your work in a conscientious manner.

Important !

Specialist knowledge and expertise are required to service and maintain the machine. The manufacturer provides this knowledge through training courses which are specially tailored for service personnel. Only personnel with Zünd certification are permitted to carry out service work on Zünd cutters.

3.25 Disposal

Disposal !

Information about proper disposal

- Identifies toxic substances that are harmful to the environment
- Relates to the disposal of harmful substances
- Warns against disposal with domestic waste or environmental pollution caused by hazardous substances and objects contaminated with such substances

Measures for disposal

Zünd cutters correspond with the requirements of the German Electrical and Electronic Device Act and generally do not contain any poisonous substances or consumables.

Contact Zünd customer services or your service partner before you dispose of your cutter.

Dispose of cutting waste in accordance with current national environmental protection regulations. In case of doubt, check the appropriate disposal methods with your local collection point or recycling centre.

4 Controls and operation

4.1 General

This chapter familiarises you with the controls, guides you through the operational procedures and describes the following operating steps:

– Daily commissioning
– Operation of the main components
– Detailed information on the operation of the machine
– Safe switching off of the machine

4.2 Safe working practices

Danger !

Operating errors or negligence can put human lives at risk as well as causing serious damage to the machine.

The machine is fitted with safety devices to minimise risk. However, these safety devices cannot guard against damage as a result of operating errors or negligent working practices.

- Observe the safety requirements from the chapter "Safety" and the situational safety requirements of the appropriate working step.

As the operator, you are responsible for the safe use of the machine.

You must observe the following:

– The safety instructions given in "Safety"
– The information contained in this chapter, bearing in mind the training provided by the manufacturer or retailer

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4.3 Controls

4.3.1 Control panel

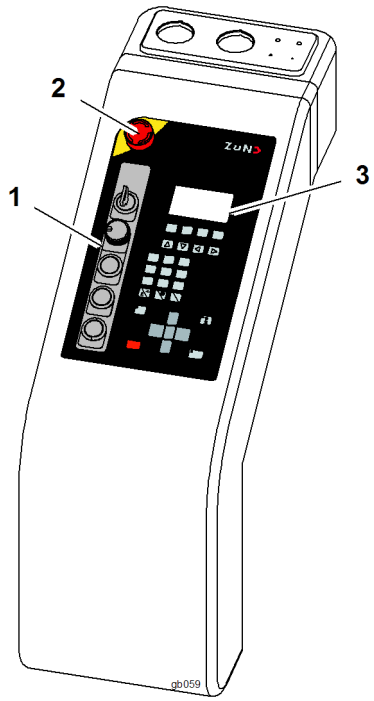

Fig. 4-1 Control panel

1 Switch unit

2 Emergency stop switch

3 Operating unit

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4.3.1.1 *Operating unit*

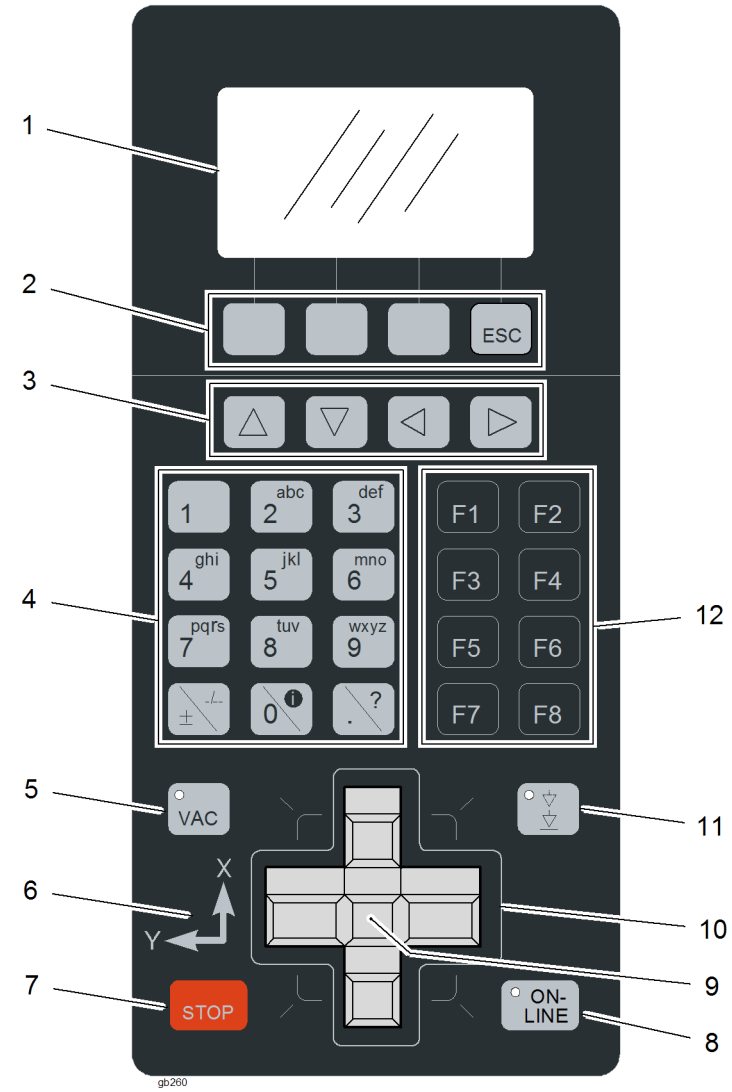

Fig. 4-2 Operating unit

1 Display
2 Soft keys
3 Navigation keys
4 Numerical keys
5 *VAC* key (vacuum)
6 Coordinate system (axes)
7 *STOP* key
8 *ONLINE* key
9 *SHIFT* key
10 Travel keys
11 *Tool up/down* key
12 Function keys

4.3.1.2 Navigation keys

Fig. 4-3 Navigation keys

Key	Function in the cutter menu
△ ▽	Use these keys to navigate through the menu
▷	• If submenus are available, use this key to change to the next menu level • Select setting/function
◁	Change from a submenu or a setting into the previous menu level

Key	Function in the editor
◁ ▷	Use these keys to move the cursor to the right and left

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4.3.1.3 Numerical keys

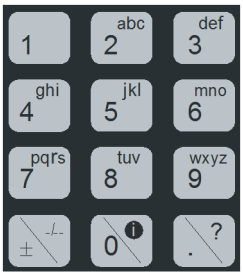

Fig. 4-4 Numerical keys

Functions of the numerical keys

- Direct entry of the menu number
- Entry of values when there is a prompt

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4.3.1.4 Function keys

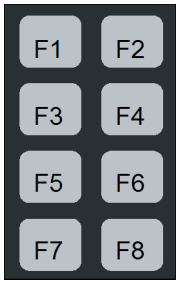

Fig. 4-5 Function keys

Important functions are distributed to the function keys and therefore can be selected directly. It is possible to programme the respective function of the function keys.

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4.3.1.5 Travel keys

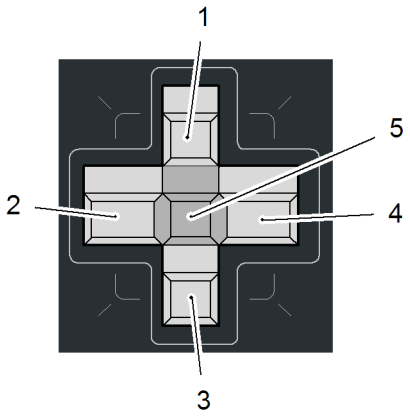

Fig. 4-6 Travel keys, shift key

1 Move module forwards
2 Move module to the left
3 Move module backwards
4 Move module to the right
5 SHIFT key

These keys are used to move the module unit in the operating statuses STOPPED and OFFLINE.

If work is being carried out in the ONLINE operating status and a travel key is pressed then the operating status changes to OFFLINE.

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4.3.1.6 Soft keys

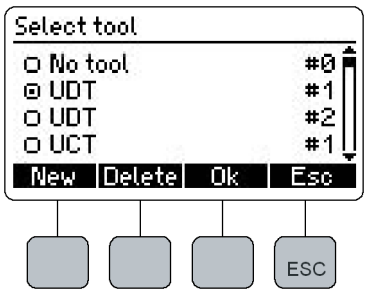

Fig. 4-7 Soft keys

These keys change their function depending on the situation. The currently valid function is shown in the display.

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4.3.1.7 Special keys, shortcuts

Important functions are defined with separate keys on the operating unit:

	Current Operating status	Function	
		With SHIFT key	Without SHIFT key
STOP	STOPPED	Switch off the machine	Change to OFFLINE
	ONLINE	Switch off the machine	Change to STOPPED
	OFFLINE	Switch off the machine	

	Current Operating status	Function	
		With SHIFT key	Without SHIFT key
VAC	Vacuum off	Switch vacuum on	Vacuum menu
	Vacuum on, suction	to switch vacuum off	
	Vacuum on, blowing		

	Current Position	Function	
		With SHIFT key	Without SHIFT key
	Up Z pos	Lift tool into park position	Lower tool into lower position
	Down Z pos		Raise tool into upper position
	Park position	-	Lower tool into upper position

	Current Operating status	Function
ON-LINE	ONLINE OFFLINE STOPPED	See section 4.6.3

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4.3.2 Emergency stop switch

Attention !

Risk of damage to the machine.

Only use the emergency stop switches to switch off the machine in an emergency - not for standard shutdown.

- Emergency stop switches are part of a protective circuit
- They allow the machine to be switched off quickly in a dangerous situation

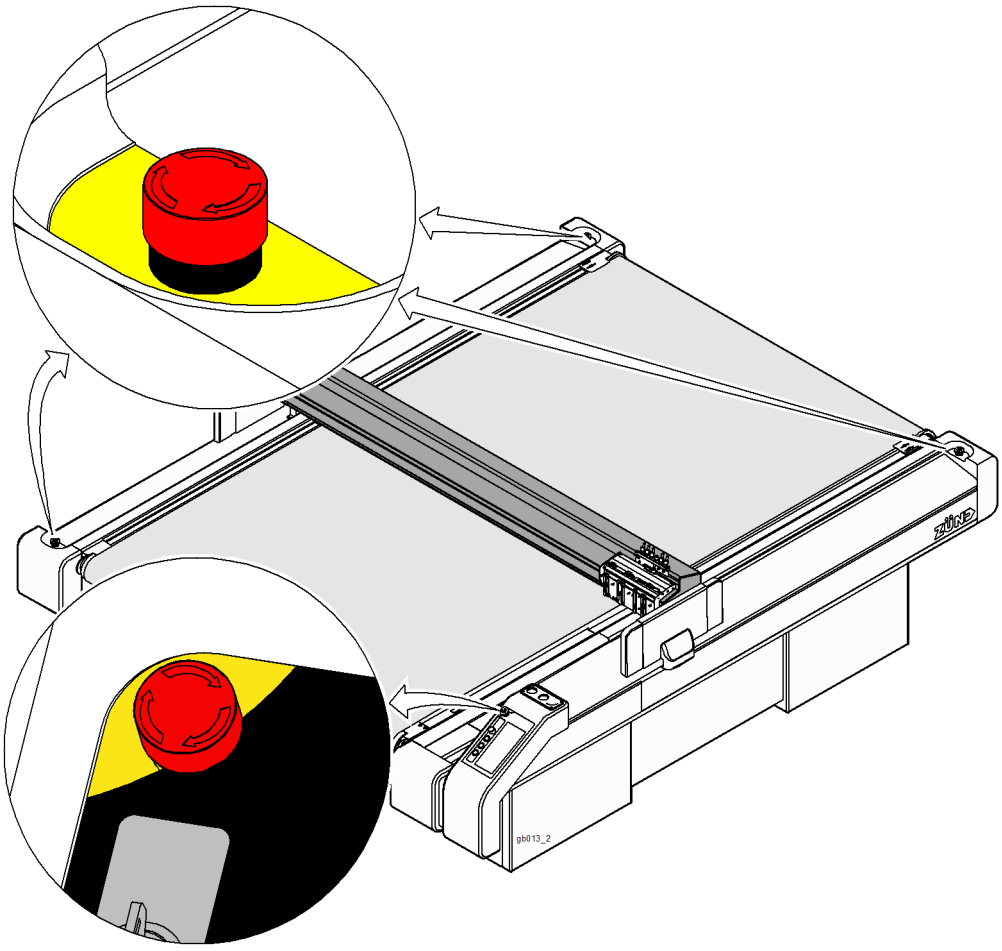


Fig. 4-8 Emergency stop switch

The machine is fitted with four emergency stop switches as standard. They are located as follows:

- 1 x on the operating console
- 3 x on the side support covers

Consequences of pressing an emergency stop switch:

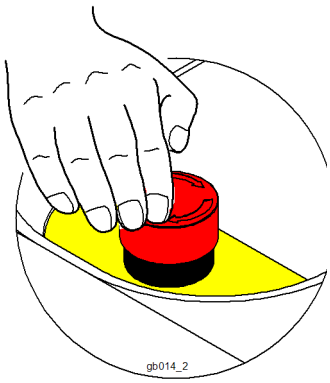
- The drive motors are brought to a standstill and then are isolated from the energy supply.
- Safety-related units (modules, tools, auxiliary drive, sheet feeder etc.) are isolated from the energy supply.
- Units that are not safety-relevant or that are important for the operation of the device (vacuum, operating unit, dust extractor, compressor etc.) remain switched on

Important !

An emergency stop switch that has been pressed remains locked in the off position.

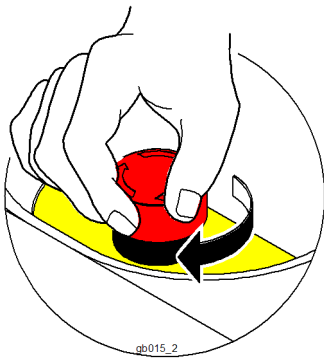
To unlock an activated emergency stop switch after regaining operational safety, turn the switch anti-clockwise.

Procedure



⇨ When a hazard or a possibly hazardous situation occurs, press an emergency stop switch without delay

✓ All machine movements are stopped. The emergency stop switch that has been pressed remains locked in the off position



⇨ Regain operational safety.

⇨ Turn the emergency stop switch anticlockwise to unlock it

⇨ Use *F1* to reinitialise the machine

Function test

Danger !

Risk of injury due to defective emergency stop switch

Machines with defective emergency stop switches are not safe for operation. In hazardous situations the machines cannot be stopped promptly.

- Check that the emergency stop switches are working on a daily basis.
- Do not start up a machine with a defective emergency stop switch until the problem has been remedied by authorised personnel.

⇨ Press all emergency stop switches before the start of work/after the initialisation of the device

✓ If the machine stops correctly then it is safe for operation

Problem solution

Does the machine not stop correctly following the activation of an emergency stop switch?

⇨ Do not start up the machine and let the authorised personnel remedy the problem.

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4.3.3 Maintenance unit

The maintenance unit adjusts the air pressure to the switching of the vacuum elements/various modules and options.

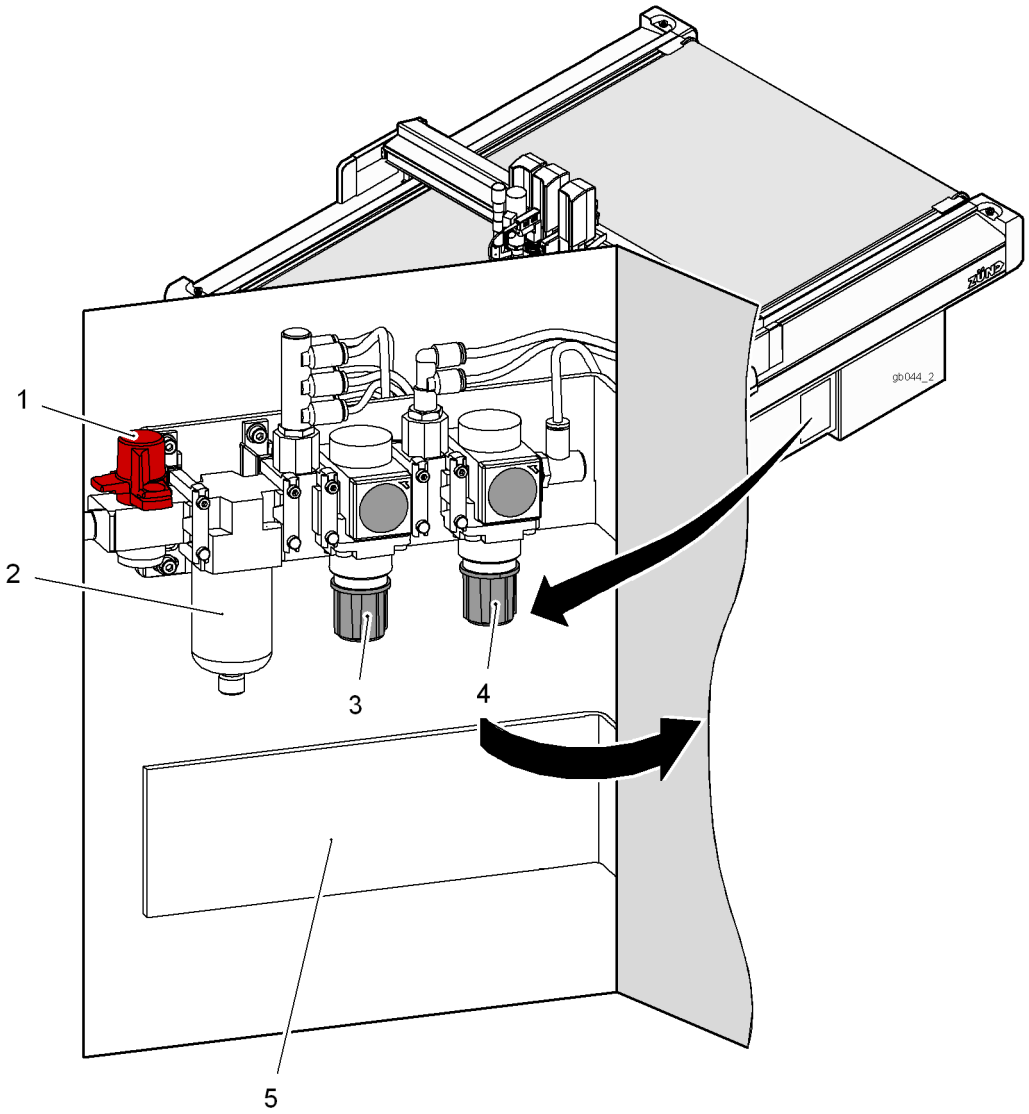

Fig. 4-9 Maintenance unit

1 Stopcock

2 Water separator

3 Air pressure setting for various modules, vacuum elements (P2)

4 Air pressure setting for conveyor clamp elements and feed elements (P3)

5 Fixing bracket for an additional, optional maintenance unit for various modules, tool inserts and options

The maintenance unit is preset and adjusted.

Check the air pressure setting at regular intervals. The settings can be found in the chapter "Product description", "Specifications".

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4.3.4 Interfaces

The machine has interfaces for data exchange. These are attached to the electronics unit.

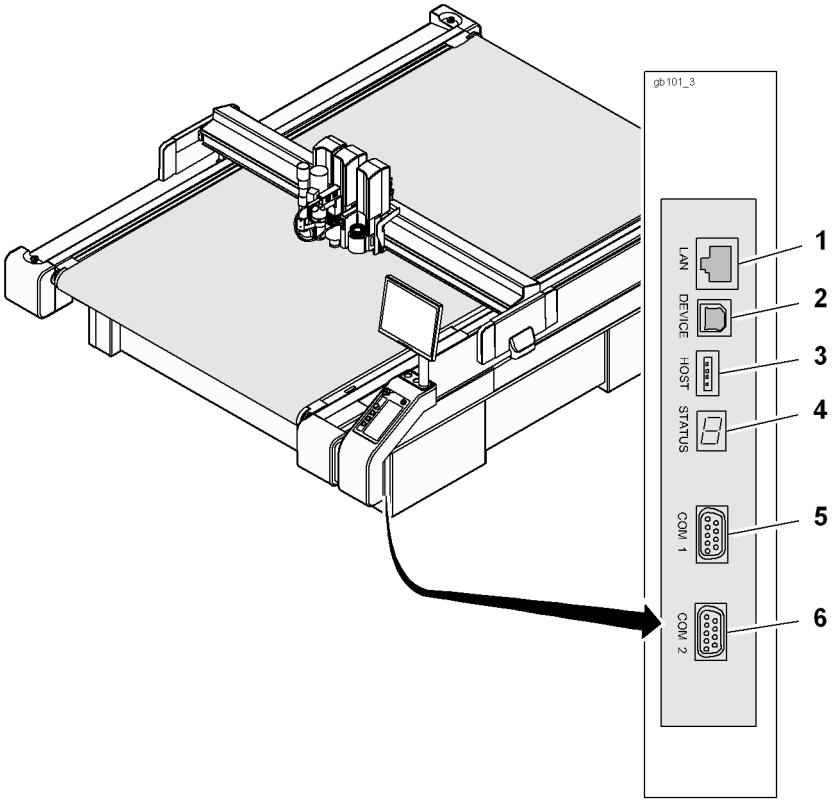

Fig. 4-10 Interfaces

1 LAN
2 Not used
3 USB (Host)
4 Status and error display
5 COM 1
6 COM 2

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4.4 Menu navigation

4.4.1 Menus and functions

Navigation

The cutter has a large number of functions. The current menu number and the current menu are displayed in the header.

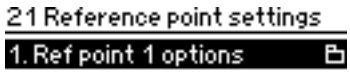


Fig. 4-11 Current menu number, menu

Graphic layout

Symbol	Description
	Menu
	Blocked menu (user level)
	Value/entry/command
	Display of a value

Navigation in the menu

⇨ Use the navigation keys ▲ ▼ to scroll through the menu and use ▶ to select a submenu/a function (e.g. Tools).

⇨ To return to the previous menu level press the navigation key ◀. Press *ESC* to return back to the main menu.

Direct selection of menus

Each menu and each function is allocated a unique menu number. It is possible to change between menus by entering the menu number. Two-figure menu numbers (10, 11 etc.) are displayed in lower positions.

Commands/functions

Commands are carried out immediately after the entry.

⇨ Use the navigation keys ▲ ▼ to mark the required command and select using ▶ .

⇨ The command can be triggered directly via the menu number. In order to do this, enter the menu number on the control panel

An exception to this rule is made for safety-relevant commands (e.g. automatic moving). These can be confirmed using OK or cancelled using ESC.

Value/entry

⇨ If a flashing cursor appears on the display below a number, then a number input is required

⇨ Enter the required value using the numerical keys

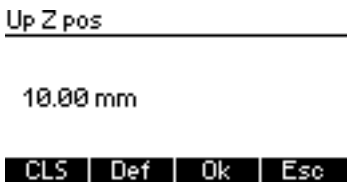
⇨ Check the value and confirm using OK or cancel the entry using ESC

Select

⇨ Use the navigation keys ▲ ▼ to select an entry from the list

⇨ Confirm using OK or cancel using ESC

Default settings (factory setting)



Default settings are available for many functions/values.

⇨ Select function

⇨ Use **Def** to reset the value to the factory setting

Min/max settings (factory setting)

Limit values are available for many functions/values.

⇨ Select function

⇨ Use **Min/Max** to set the value to the upper/lower limit value

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4.4.2 Help

Help texts are available for important menu entries. In order to display a help text, mark the required menu and press the [?] key.

4.4.3 Info Menu

Within the menu the Info Menu can be activated with the [i] key.
Use the [◀] [▶] keys to switch between tabs. Use the [▲] [▼] keys to scroll up/ down within the tab.

Tabs

Tab	Information
Head	Information on the module carriage
Module	Information on the module
Position	Specification of the current position of the current tool
Buffer	Information on the memory system
Job	Information on the print job
Status	Display of the user level, the operating status etc.
Function keys	Allocation of the function keys

4.4.4 Popups/dialogues

Popup menus/dialogues are displayed for the following actions:

- Error messages (dialogue)
- Cutter status display (dialogue)
- Menus that are called up using function keys (popup)

The system changes back to the previously active menu when a popup or a dialogue is closed.

4.4.5 User level

Access to menus and functions is blocked according to the user level. The user levels have a hierarchical structure. This means that the next highest user also has the access rights to the menu functions that the subordinate user has.

User level	Description
Users 1 - 3	All menus and functions that are needed for the operation of the machine are accessible
Operator	simple, uncomplicated settings work is permitted
Service	Cutter settings that can only be carried out by authorised service personnel
Factory setup	-

Change user levels

⇨ Change to the menu *Password*4-2

⇨ Enter your user code

✓ The user level is approved and is displayed under *User*4-1

Problem solution

Does the system not change to the required user level?

⇨ Check the user code for your user level and repeat the entry.

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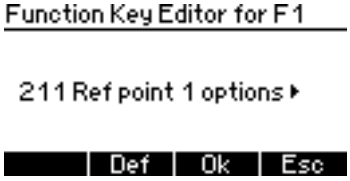
4.4.6 Function keys

The cutter has function keys (F1 - F8) which can be allocated menu functions. These keys can be selected via the menu or directly.

Allocate function keys directly

⇨ Press the SHIFT key and the function key (F1 - F8) which you wish to change at the same time



⇨ The window for function key selection opens

⇨ Use the number field to enter the menu number of the required menu entry

⇨ Confirm using OK or cancel using ESC

Allocating the function key via the menu

⇨ Select the menu *Function keys* 6-5

⇨ Enter the numbers 1 - 8 for the respective function key F1 - F8

⇨ The window for function key selection opens

⇨ Use the number field to enter the menu number of the required menu entry

⇨ Confirm using OK or cancel using ESC

Resetting a function key to the factory setting

⇨ Change to the menu *Function keys*6-5

⇨ The window for function key selection opens

⇨ Press the *DEF* key in order to activate factory settings

⇨ Confirm using OK or cancel using ESC

4.5 Functions

4.5.1 Set language

It is possible to select the display language of the cutter.

⇨ Select the *Language* 6-1 function from the menu

⇨ Select the required language from the list and confirm

4.5.2 Set display

Setting the contrast

Key	Description
Shift + ►	Increase contrast
Shift + ◄	Reduce contrast

Switch lighting on/off

⇨ Shift + ESC must be pressed to switch the display lighting on/off

4.5.3 Setting the volume of the signal

Key	Description
Shift + ▲ ▼	Increase/decrease the volume

4.5.4 Delete data buffer

Delete the data buffer following the termination/processing of a job.

Menu	Description
2-5-1	Delete data buffer

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4.6 Operation

4.6.1 Daily checks prior to start-up

Attention !

There is a risk of injury if the machine is defective.

Faults on the machine may be the cause of malfunctions and accidents - never start up a defective machine.

- Report all defects and faults to your supervisor and arrange for them to be rectified immediately by qualified personnel.

Inspection

Ensure that all maintenance and service tasks are performed in accordance with the maintenance schedule.

Before starting up the machine each day, perform a walk-round of the machine and check the following:

- Check the machine for visible damage
- Remove local dirt caused by processing materials and dust
- Remove objects from the processing table/the side supports
- Check whether all maintenance and service covers are installed correctly

4.6.2 Start-up

Switching on the machine

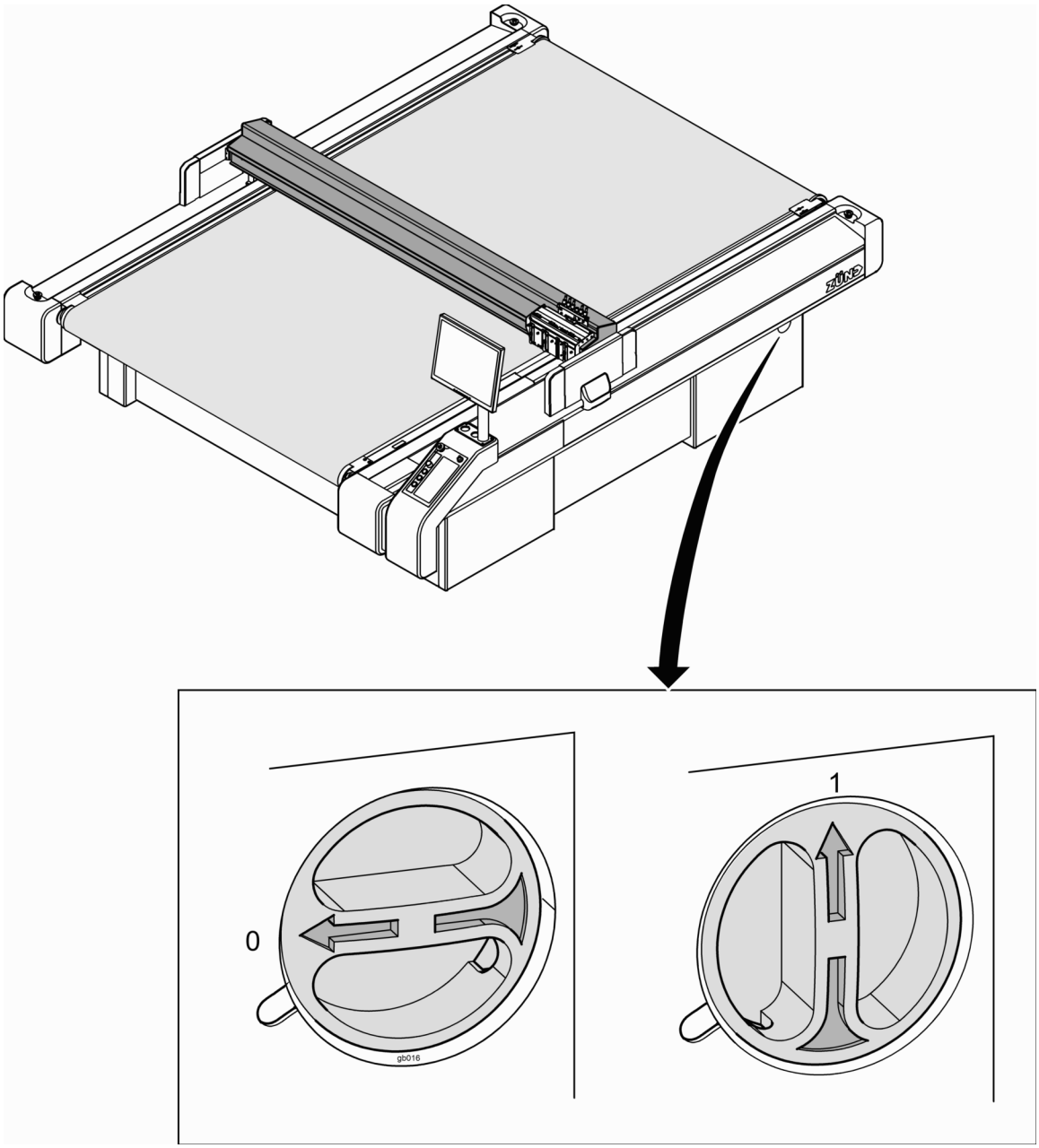

Fig. 4-12 Switching on the machine

⇨ Switch the main switch to position ON (1)

✓ The cutter switches on. The start page appears on the display

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Initialising the machine

Attention !

Risk of injury due to automatic starting of the machine

Following initialisation, the operating status OFFLINE is active. The cutter can receive commands from the operation software which activate the operating status ONLINE.

- Only switch on the operation software following the initialisation of the machine.

⇨ Press the function key F1 .

✓ The machine is initialised

4.6.3 Operating status

The cutter can be switched into three operating statuses depending on the purpose:

– OFFLINE
– ONLINE
– STOPPED

A combination of keys can optionally be used to switch from any operating status to either of the other two operating statuses.

The current operating status is displayed in the header of the main menu and with the LED of the ONLINE key.

The following graphic illustrates how the desired operating status is activated.

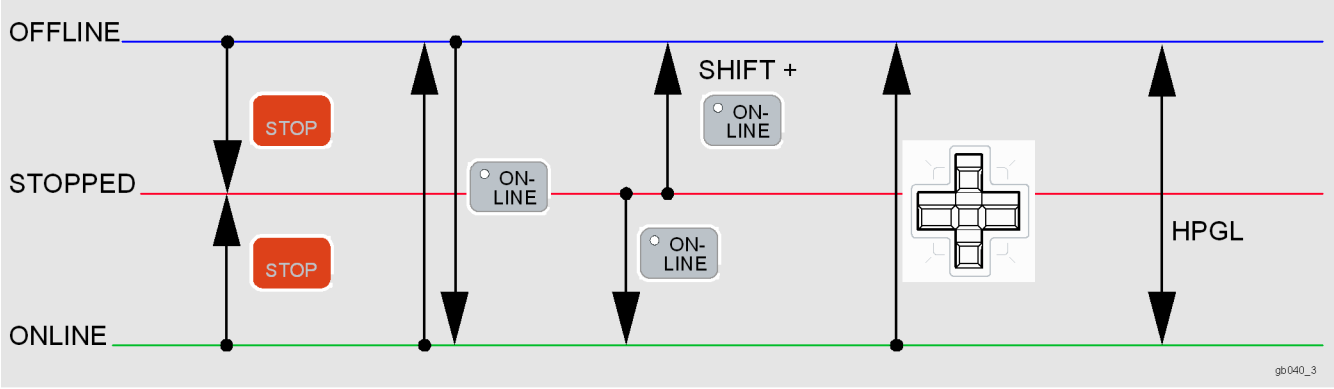

Fig. 4-13 activate operating status

4.6.3.1 *OFFLINE*

Attention !

Risk of injury due to automatic starting of the machine

In the OFFLINE operating status, the cutter receives commands from the operating software. These commands can be used to switch to the operating status ONLINE.

- Activate the operating status STOPPED during breaks.
- Always carry out set-up work in the operating status STOPPED.

A red flashing LED on the ONLINE key indicates that the operating status OFFLINE is active.

When the machine is switched on, the operating status OFFLINE is active.

In this status, commands are received from outside but they are not processed.

Operating software commands can be used to switch to the operating status ONLINE.

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4.6.3.2 STOPPED

Important !

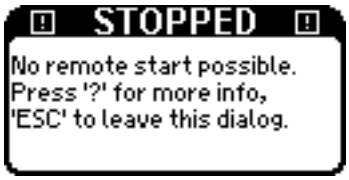
The operating status STOPPED protects the operator from the machine being set into motion using remote controls.

ON-LINE

A red illuminated LED on the ONLINE key indicates that the operating status STOPPED is active.

In this operating status, commands (e.g. HPGL) are received but they are not processed. Even commands from the operating software (e.g. to change to the ONLINE operating mode) are ignored.

⇨ STOP must be pressed in order to activate the operating status STOPPED. The displays shows the following message:



⇨ Use ON-LINE to switch from the operating status STOPPED to ONLINE or use SHIFT ON-LINE to switch to the operating status OFFLINE in order to reactivate the remote control.

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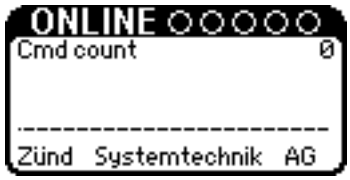
4.6.3.3 ONLINE

ON-LINE

A green illuminated LED on the ONLINE key indicates that the operating status ONLINE is active.

Commands are received and processed in this operating status.

⇨ ON-LINE must be pressed in order to activate the operating status ONLINE. The displays shows the following message:



⇨ Use STOP to switch from the operating status ONLINE to the operating status STOPPED or use ON-LINE to change to the operating status OFFLINE.

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4.6.4 Moving the bar/module manually

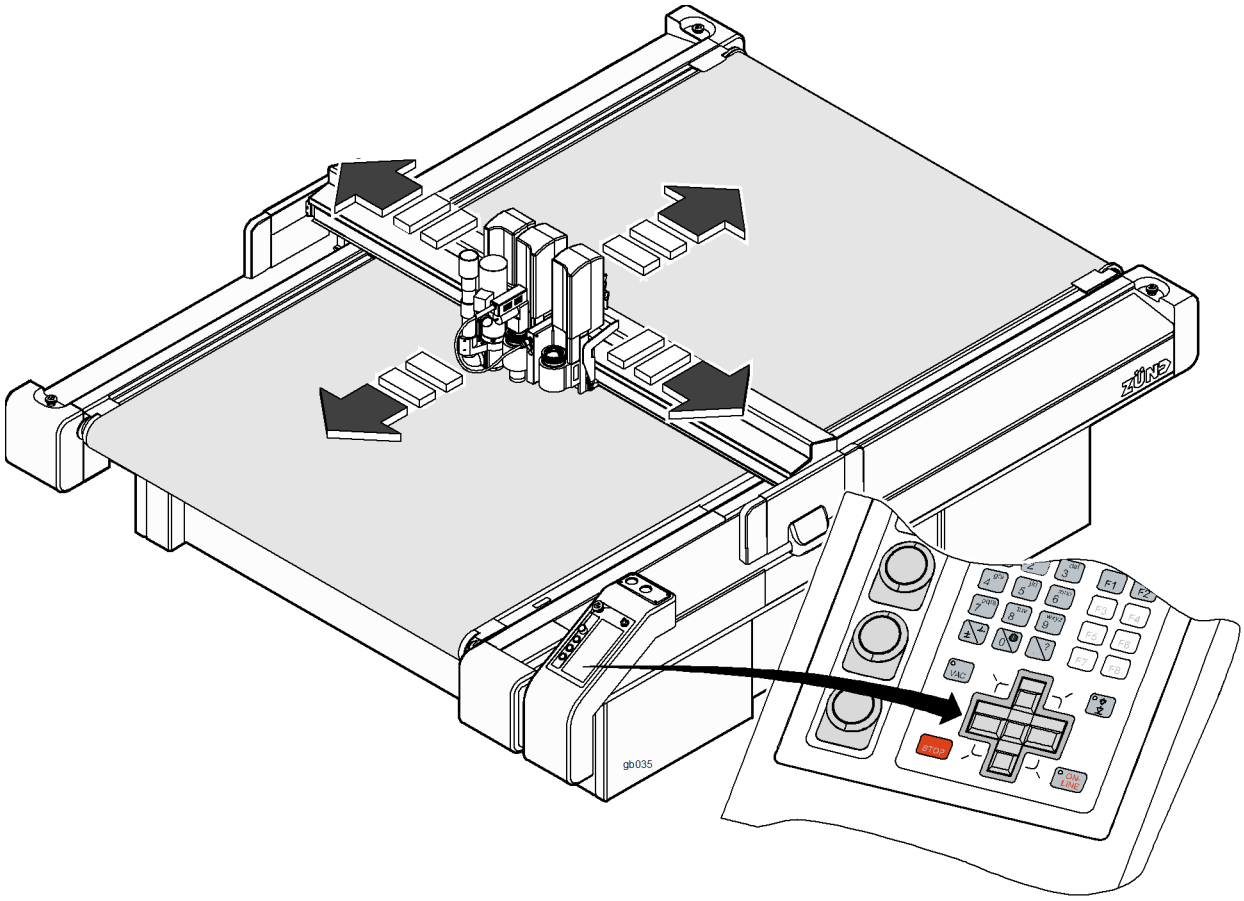

Fig. 4-14 Moving the bar/module

The module carriage can be moved using the travel keys in the operating status OFFLINE. The assignment of keys corresponds to the direction of travel.

Pressing the SHIFT key at the same time will make the module carriage move faster.

Pressing travel keys in the X and Y direction at the same time will make the module carriage move diagonally.

If one or more travel keys are pressed in the operating status ONLINE then an emergency stop is triggered.

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4.6.5 Tool handling

Modules are independently recognised by the cutter control unit. Tools, on the other hand, do not have automatic recognition and must be manually allocated to a module.

Tool-specific parameters (initialisation, moving speeds, acceleration) are saved to the corresponding tool and can be called up again at any time.

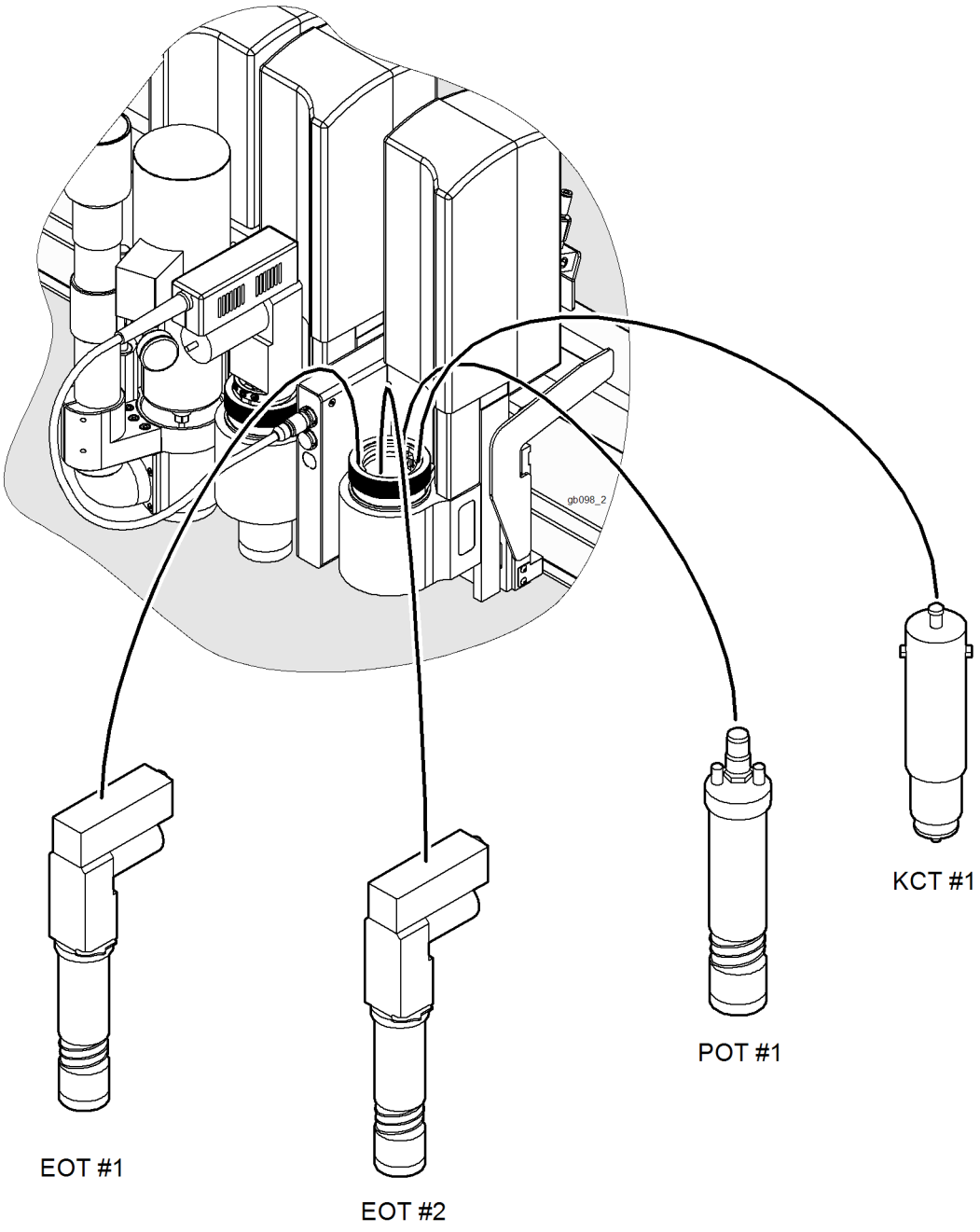

Fig. 4-15 Tool handling

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Marking the tools (e.g.)

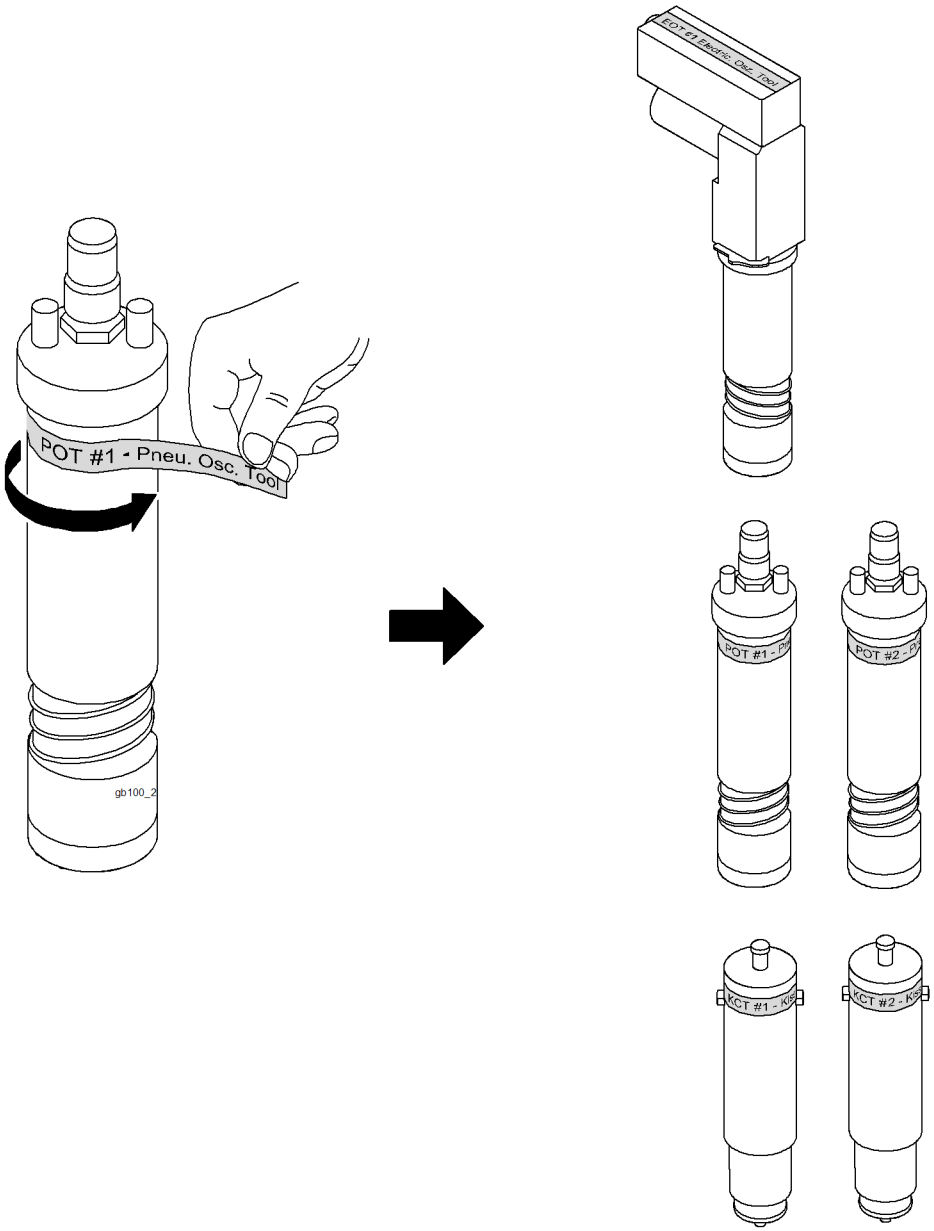


Fig. 4-16 Marking the tool (e.g.)

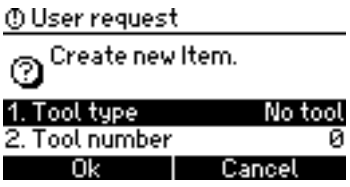
⇨ Label all tools of the same type with a consecutive number. Appropriate adhesive labels are supplied with the equipment.

Create new tool

⇨ Insert the marked tool in the required module

⇨ Choose *Select tool*/1-1-1-1 in the menu

⇨ Select NEW



⇨ The popup menu *Create new entry* opens

⇨ Select *Tool type*

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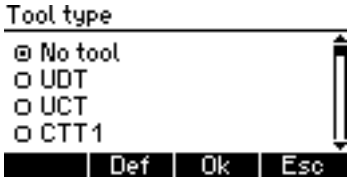
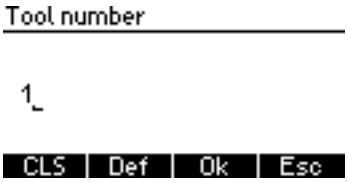


⇨ All tool types that can be used in the current module are displayed in the popup menu *Tool type*. Select the tool from this list and confirm using OK



⇨ Enter the appropriate number of the tool in the popup menu *Tool number* and confirm using OK

Select tool

⇨ Inserting the module

⇨ Inserting tool

⇨ Choose *Select tool*1-1-1-1 in the menu

⇨ Use ▶ to change to the *Tool* menu.
All tools already assigned to this module are listed.

⇨ Select the required tool

Save tool-specific cutter settings

⇨ Use ESC to change to the main menu

⇨ The tool-specific settings that have been made are automatically saved

4.6.6 Modules/tools

4.6.6.1 General

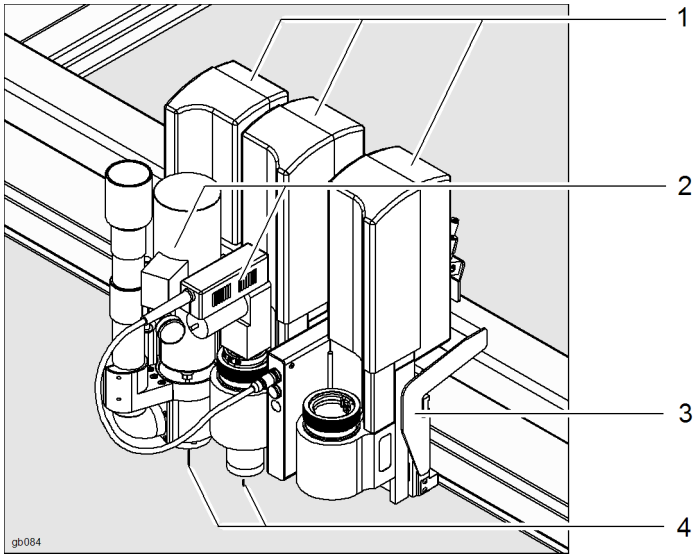


Fig. 4-17 Module carriage/module/tool/knife, router etc.

1 Module (e.g.: RM, UM)

2 Tool (e.g.: 1,000 W motor spindle, oscillating tool)

3 Module carriage (e.g.: 3-way)

4 Router, knife etc.

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4.6.6.2 Inserting/replacing the module

Module mount

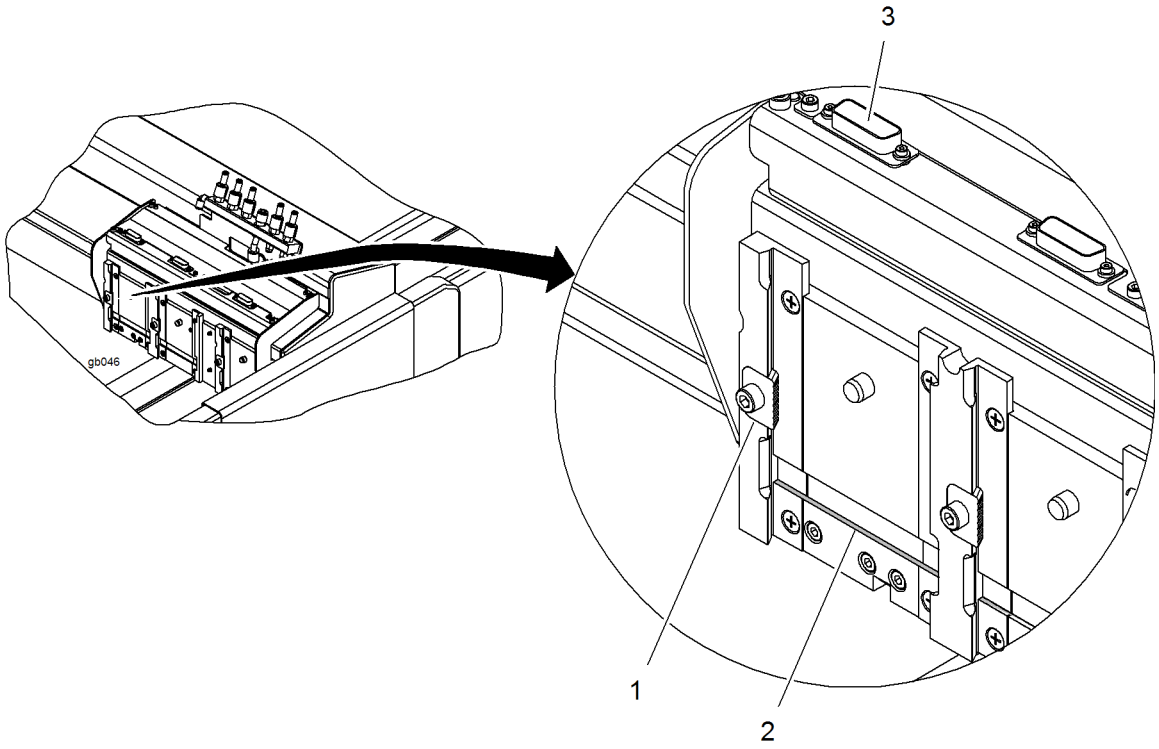

Fig. 4-18 Module mount

1 Locking mechanism
2 Mounting ledge
3 Electrical connection

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Inserting/replacing the module (e.g. UM)

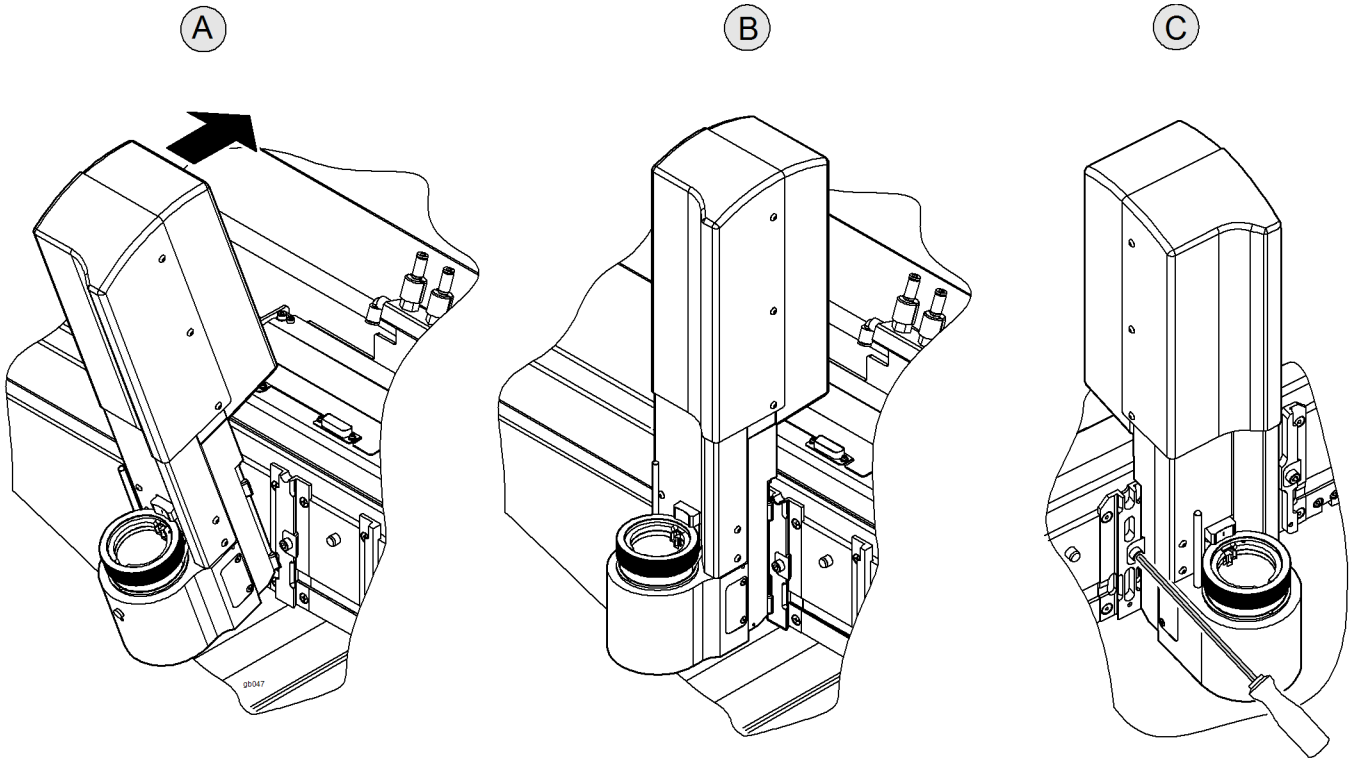

Fig. 4-19 Inserting the module

⇨ Select *Change module*1-5-1. The module carriage moves to the control panel
⇨ Position the module on the mounting ledge as shown in Fig. 4-19, step A
⇨ Tilt the module backwards onto the module carriage
⇨ Lower the module until it stops
⇨ Use the 4 mm Allen key to fix the module in place
✓ The module is now mounted and is located by the software

Problem solution

The module cannot be lowered.

⇨ Loosen the module locking mechanism before insertion

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4.6.6.3 Tool (e.g. oscillating tool)

Ensure, that following preconditions are fulfilled:

- ❏ The machine is switched off and is in the operating status STOPPED
- ❏ The module is now mounted and has been located by the control unit

Insert and connect the tool

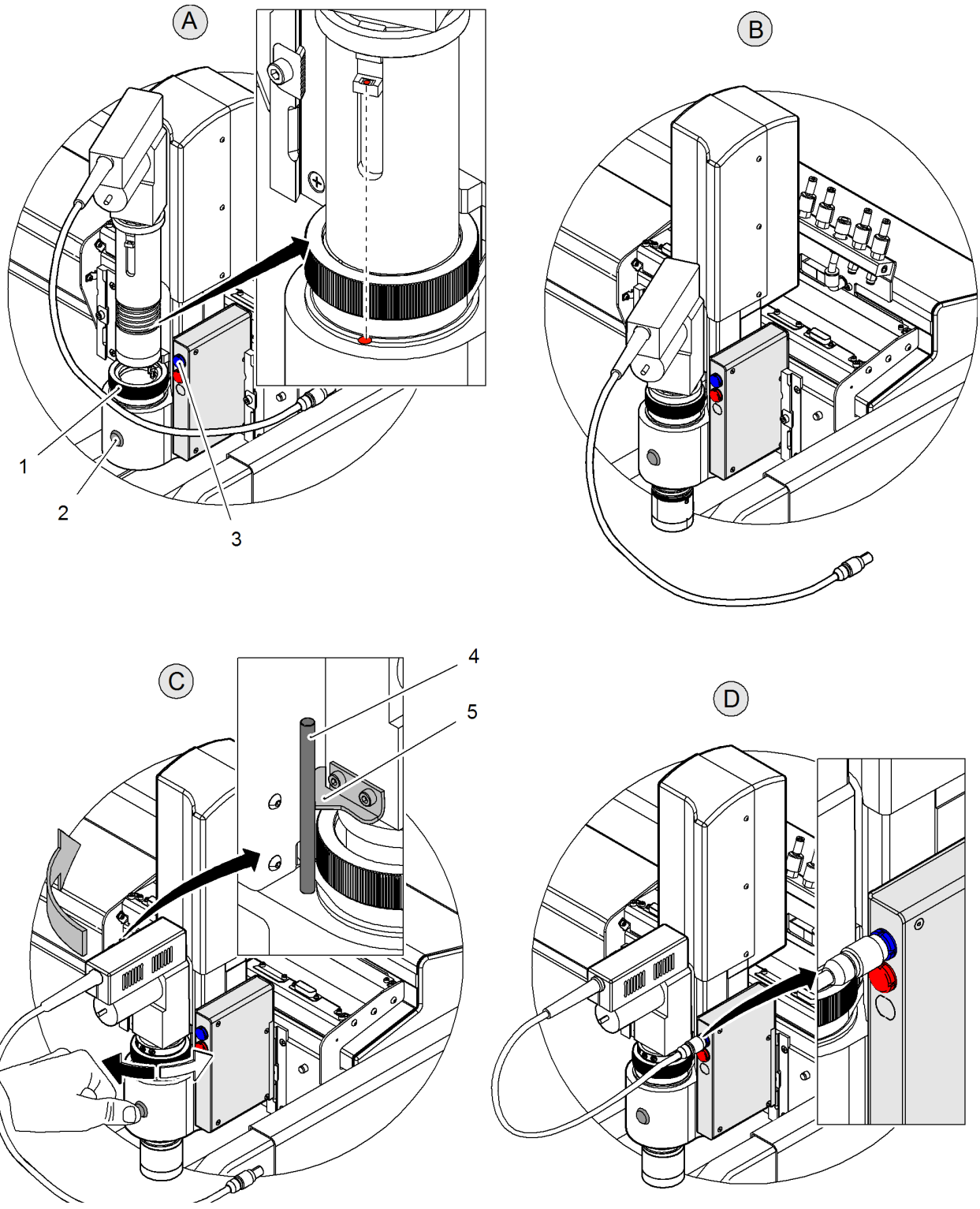

Fig. 4-20 Inserting tool

1 Bayonet catch
2 Module lock
3 Connector socket
4 Positioning spindle
5 Positioning bracket

⇨ Move the module to the lower right-hand corner
⇨ Use STOP to switch to the operating status STOPPED
⇨ Insert the **selected** tool into the module holder. Ensure that the red point on the module is located above the module lock

Important !

The tool holder and a holding fixture are each marked with a red dot. The tool is in the correct position when the dots are aligned.

⇨ Lower the shaft of the tool into the module opening until it stops
⇨ Press the module lock and latch the bayonet catch
⇨ Turn the tool in a clockwise direction until the first notch on the positioning bracket engages with the positioning spindle
⇨ Connect the tool to the connector socket

4.6.7 Connecting driven tools - allocating port

Driven tools (e.g.: EOT, DRT, POT) require an energy supply (electrical, pneumatic). This energy supply is controlled by the cutter control unit. Electrically driven tools are inserted into the intended port on the connector control of the laser pointer/ICC camera. Pneumatically driven tools are already internally connected to the compressed air supply. A port is allocated to each individual connection which must be assigned via the cutter control unit before the initial commissioning of the respective tool. There are 3 electrical connections (ports) available on the distributor of the laser pointer/ICC camera. Pneumatic tools can be assigned to other ports.

Connection - pneumatic tools

Tool	Connection (port)
POT	Port 4

Procedure

⇨ The tool is attached and allocated to the module
⇨ Use *Tool connector*1-1-1-3-1-1 to allocate the tool connection to the corresponding port
✓ The tool is ready for use

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4.6.7.1 Connection - electrical tools (EOT, DRT, etc.)

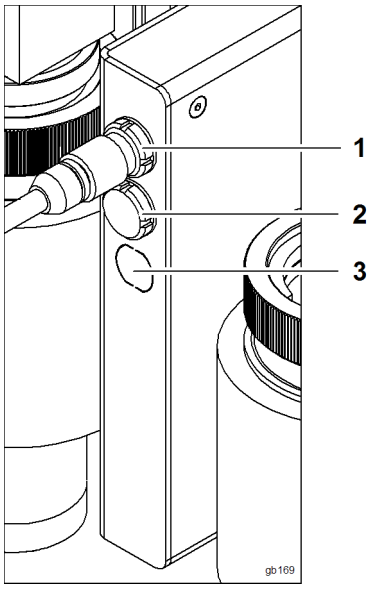

Fig. 4-21 Connection - electrical tools

1 Connection 1 = port 1

2 Connection 2 = port 2

3 Connection 3 = port 3

Procedure

⇨ The tool is attached and allocated to the module

⇨ Insert the tool into the connection provided

⇨ Use *Tool connector*1-1-1-3-1-1 to allocate the tool connection to the corresponding port

✓ The tool is ready for use

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4.6.7.2 Connect pneumatically driven tools

Pneumatically driven tools and modules are connected to the interface unit on the module carriage. The pressure is set using a maintenance unit. The air supply is connected to the local installation or supplied via a compressor. The connection data and connection procedure may be found in the operating instructions for the appropriate tool/module.

Important !

Always use a stopper to protect connection P4 from dirt in the air supply. If particles of dirt reach the tool, it will be damaged.

Interface unit - connections

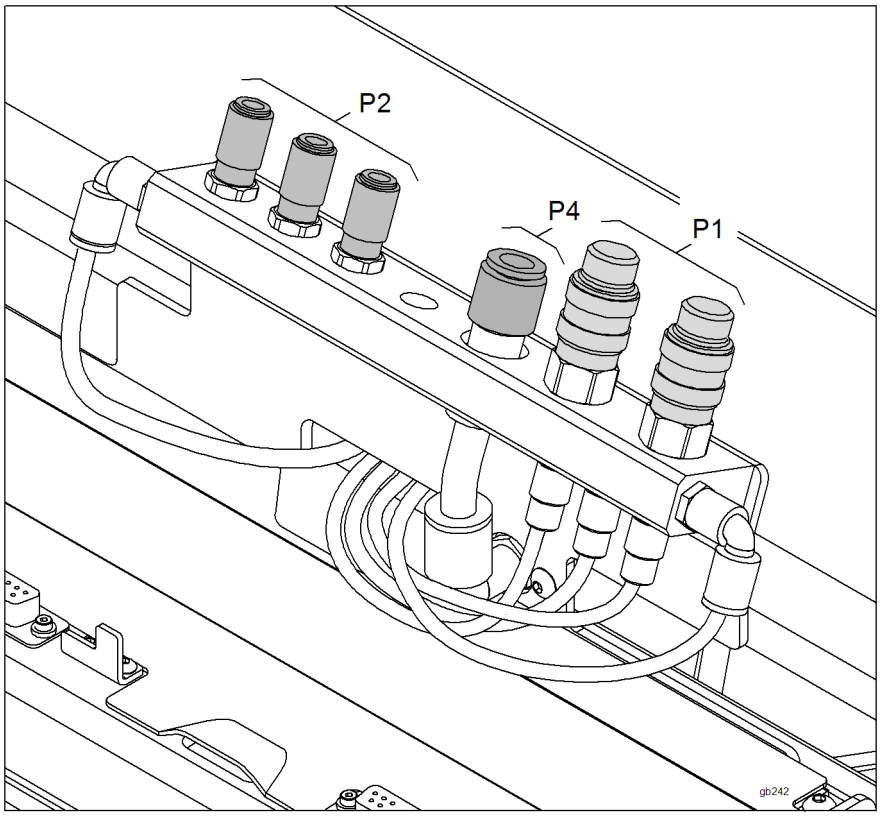

Fig. 4-22 Interface unit - connections

P1 PUM/NOM (Punch/notch module)

P2 Various tools with a working pressure of 0.6 MPa

P4 POT

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4.6.8 Activating the module

It is often useful to activate a module/tool in order to check settings. This function can only be carried out in the main menu

⇨ Activate the required module

Module	Key combination
Module 1	Shift + 1
Module 2	Shift + 2
Module 3	Shift + 3

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4.6.9 Tool positions

Example: EOT/POT/universal cutting tool

Three tool positions are possible following initialisation

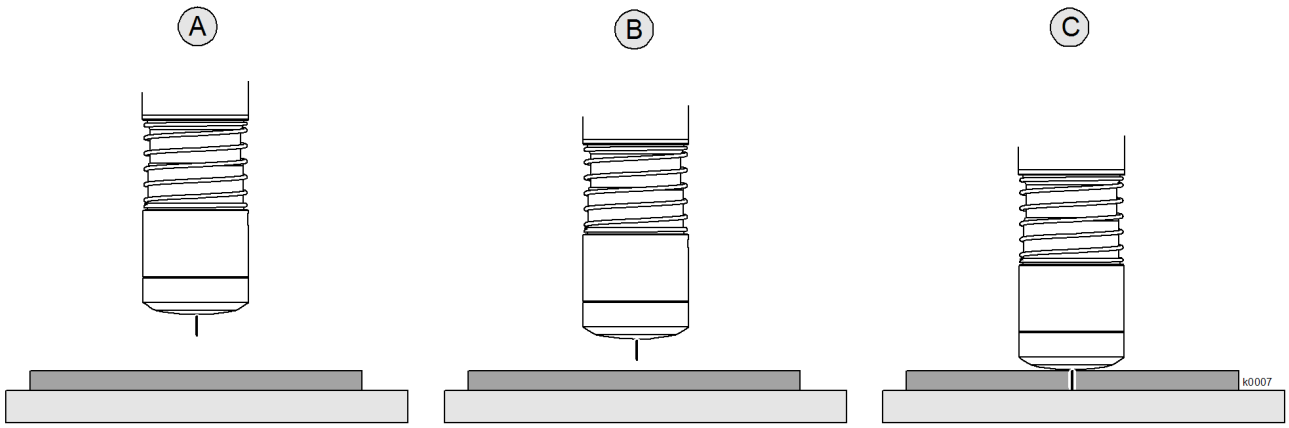

Fig. 4-23 Tool positions

Item	position	Description	Key	Signal
A	Park position	Moves to the highest position on the Z axis	SHIFT +	
B	Up Z pos	Zero point + *Upper position*		
C	Down Z pos	Zero point + *Lower position* + *Z offset*		

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4.7 Material hold-down

The material is held down via a vacuum. For this purpose, the machine table is divided into 0 - X vacuum zones. The number of zones is dependent on the size of the cutter. The width of the **continuously active** vacuum zone 0 is 470 m; the width of each additional vacuum zone which can be activated is approx. 80 mm. The first vacuum zone is positioned on the right-hand side of the worktop; all other zones can be sequentially switched on/off from right to left.

The strength of the hold-down can be adjusted and is regulated via the control panel. Only set the hold-down to be as strong as is necessary in order to save energy and so that the device is not overloaded.

The vacuum is generated for the hold-down via a vacuum generator which is positioned under the cutter.

Depending on the size and the power requirement, either a turbine vacuum generator or a gas ring vacuum pump is used for the G3 series.

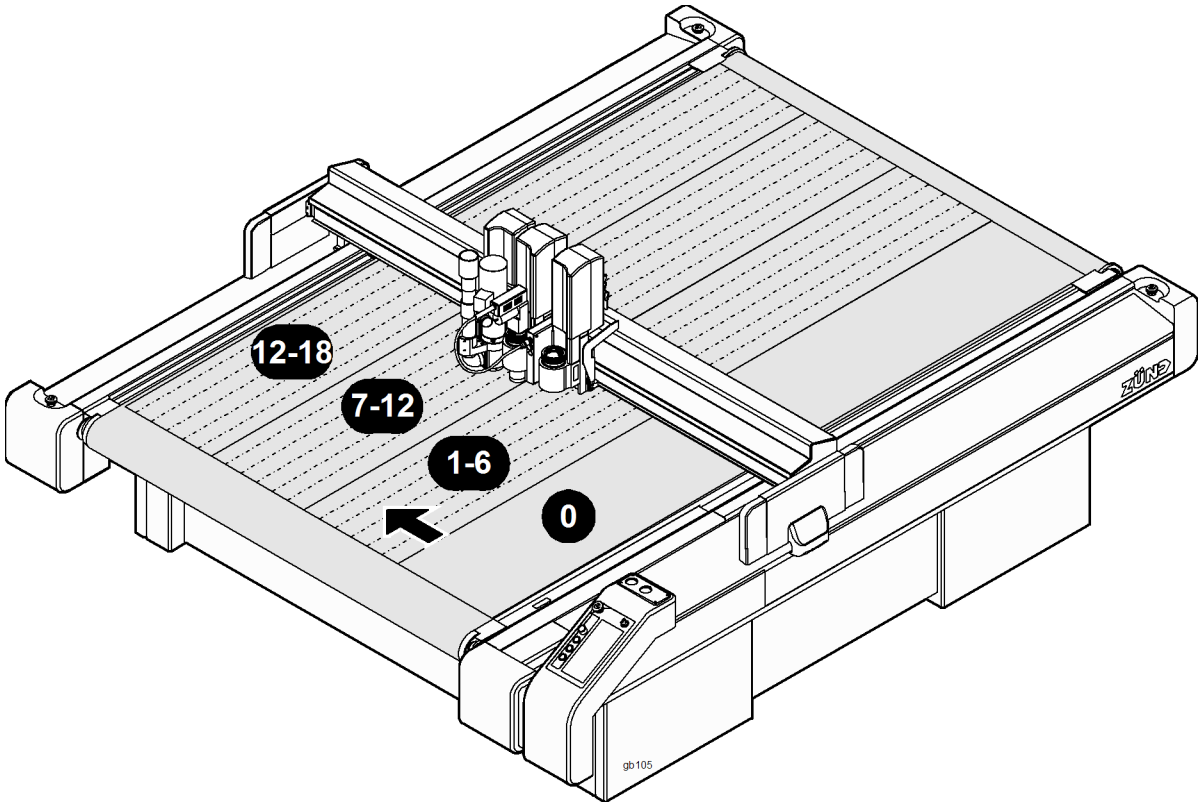

Fig. 4-24 Vacuum zones (e.g. L-2500)

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4.7.1 Preparation

Cover the excess vacuum surface in order to achieve optimum material hold-down during the processing procedure.

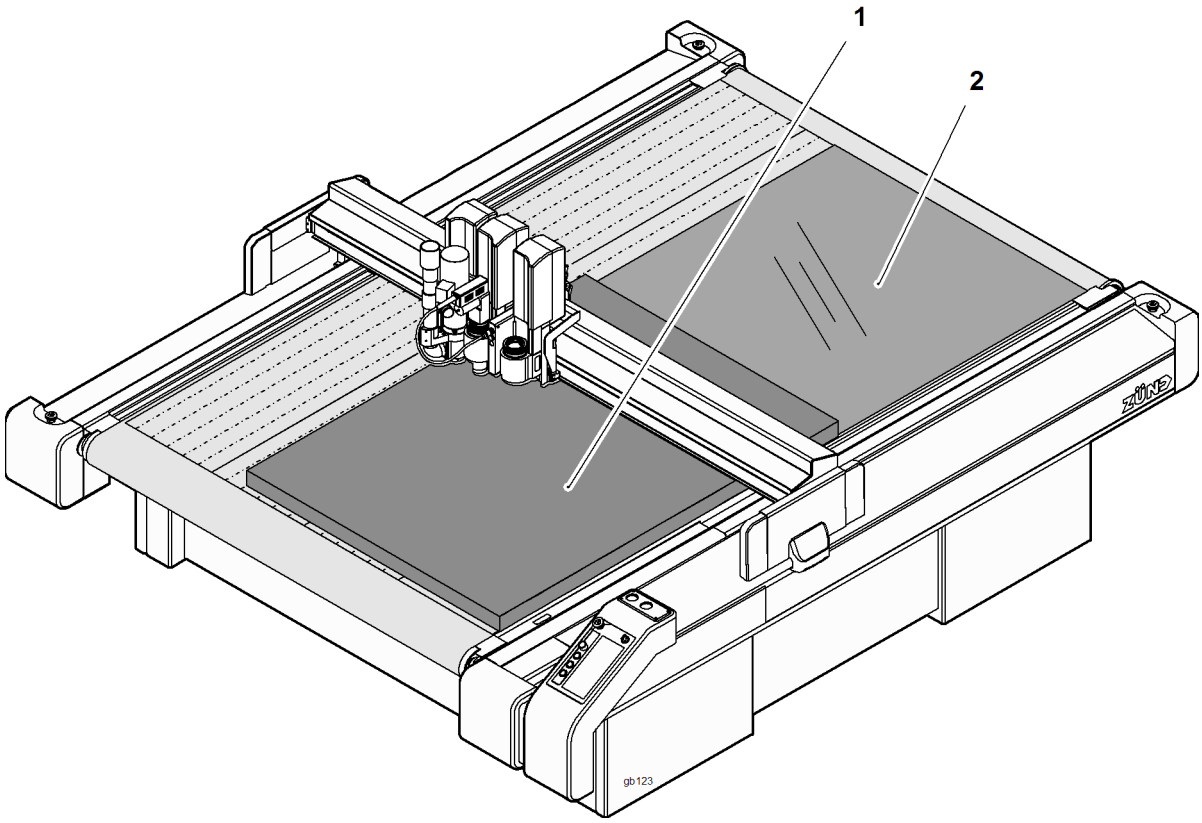

Fig. 4-25 Defining the vacuum range

1 Material being processed

2 Covering the excess vacuum area

⇨ If possible, position the material to be processed at the zero point of the work surface

⇨ Use a tarpaulin/airtight material to cover the excess vacuum area

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4.7.2 Defining/checking the vacuum range

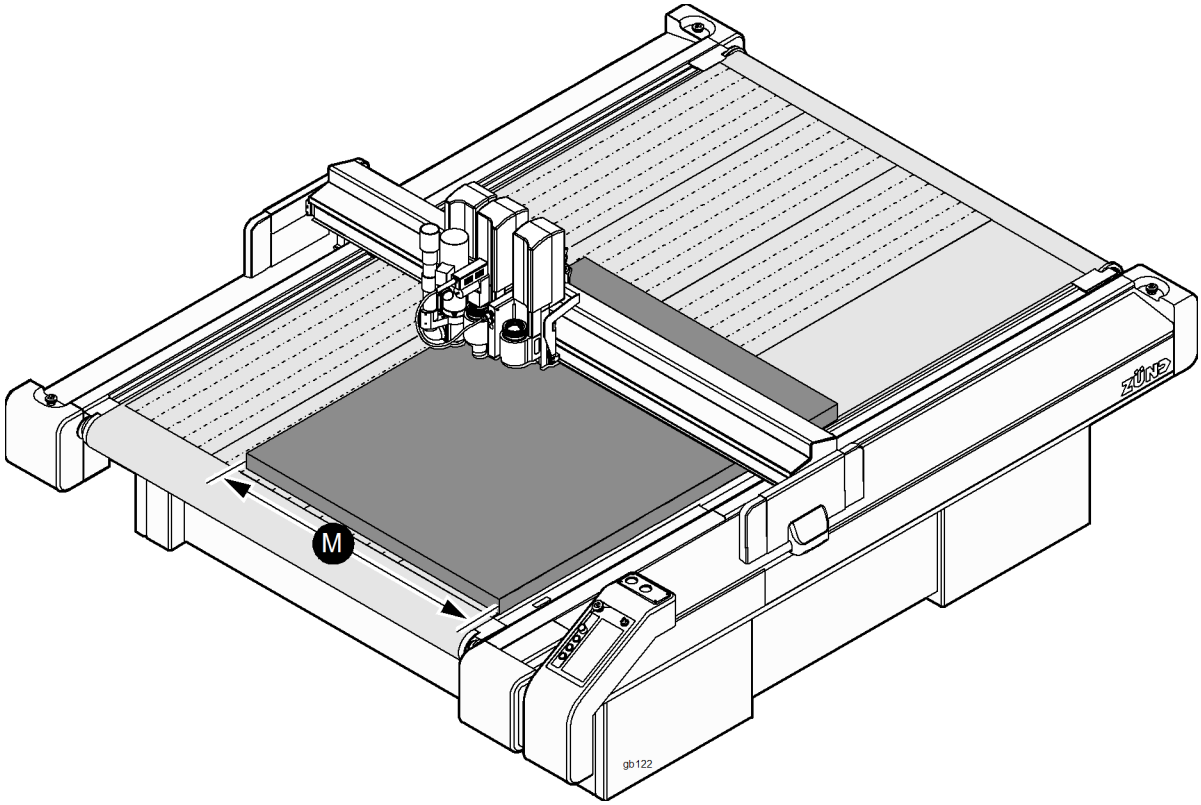

Fig. 4-26 Defining the vacuum range

Defining the vacuum range

⇨ Use the VAC key to change to the menu *Hold down functions* 3-1

⇨ Select the function *Vacuum range* 3-1-1-7

⇨ Use the travel keys to approach the left edge of the material to be processed

⇨ Choose OK to confirm

✓ The vacuum range has been defined

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Check the range

⇨ Use the VAC key to change to the menu *Hold down functions* 3-1
⇨ Change to the submenu *Vacuum range* 3-1-1-7
⇨ Select the function *Move to vacuum* 3-1-1-7-4
⇨ Choose OK to confirm
✓ The active module moves to the defined vacuum width

4.7.3 Setting the strength

⇨ Use the VAC key to change to the menu *Hold down functions* 3-1
⇨ Change to the submenu *Vacuum* 3-1-1
⇨ Select the function *Power level* 3-1-1-5
⇨ Enter the required power level and confirm using OK

4.7.4 Switching on/off

⇨ Use the VAC key to change to the menu *Hold down functions* 3-1
⇨ Change to the submenu *Vacuum* 3-1-1
⇨ Select the function *Vacuum on/off* 3-1-1-2
⇨ Choose OK to confirm

4.8 Feeding options*

The Zünd feed system allows the material to be processed to be transported on with a conveyor belt following a completed work process.

The conveyor belt is gripped and fed using two clamping elements, while the material to be processed is fixed with feeding clamps/a feed guide rail.

The arrangement and activation of the feeding clamps is determined based on the material to be processed. If a feed guide rail is used then all feed elements are activated/in fixed positions.

Depending on the size of the table or the material to be processed, an auxiliary drive is used to support the bar during feeding. The feed direction is defined via the position of the auxiliary drive.

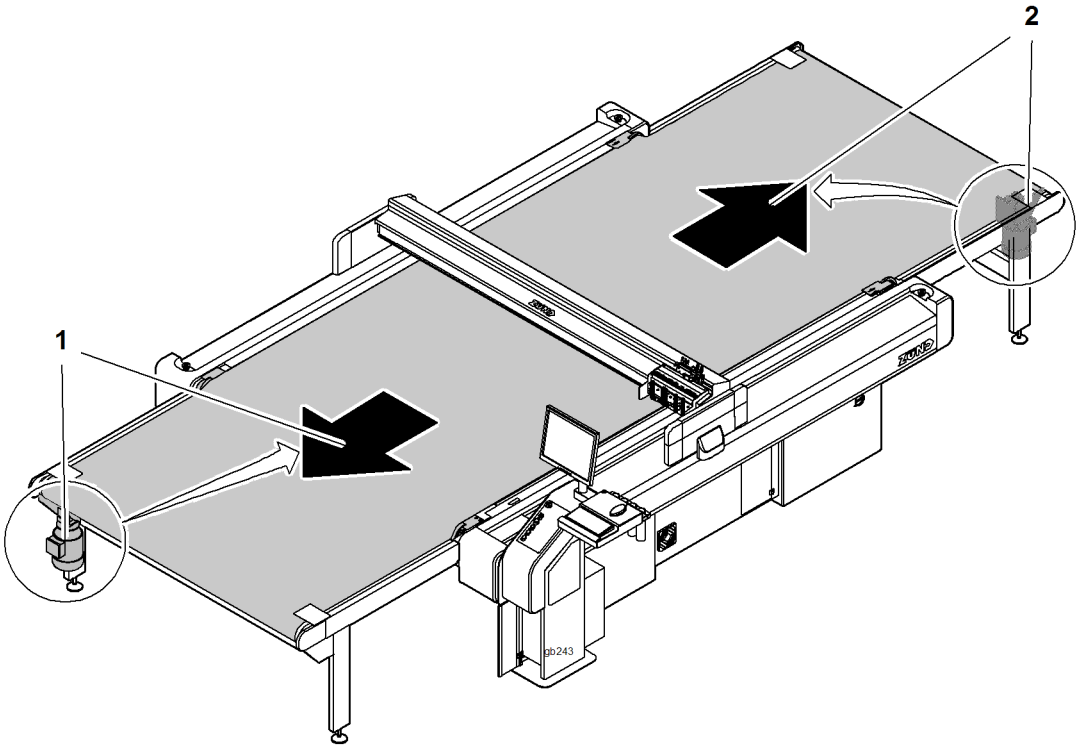

Fig. 4-27 Feed direction - position of auxiliary drive

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4.8.1 Feeding clamps

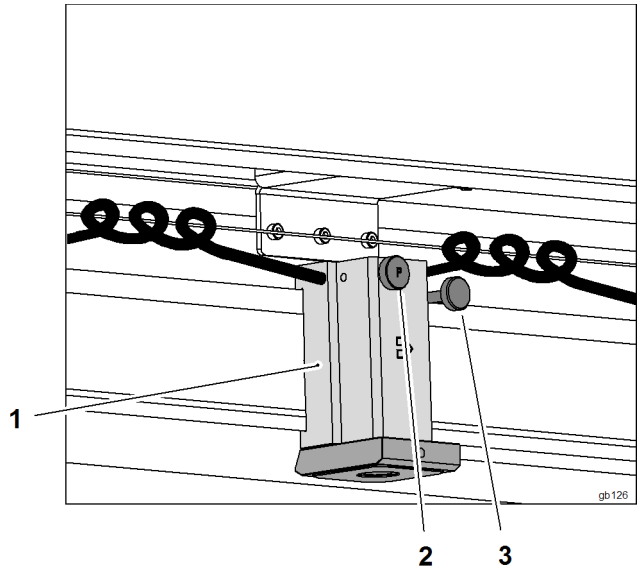

Fig. 4-28 Feeding clamp

1 Feeding clamp
2 Compressed air on/off
3 Hold-down of the feeding clamps

Setting the feeding clamps

⇨ Loosen the screw for fixing the feeding clamp
⇨ Position the feeding clamp (pay attention to the hose length)
⇨ Tighten the screw for fixing the feeding clamp

Activating/deactivating feeding clamps

⇨ Turn the screw clockwise in order to deactivate the vacuum element
⇨ Turn the screw anti-clockwise roughly three rotations in order to activate the vacuum element

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4.8.2 Feed guide rail

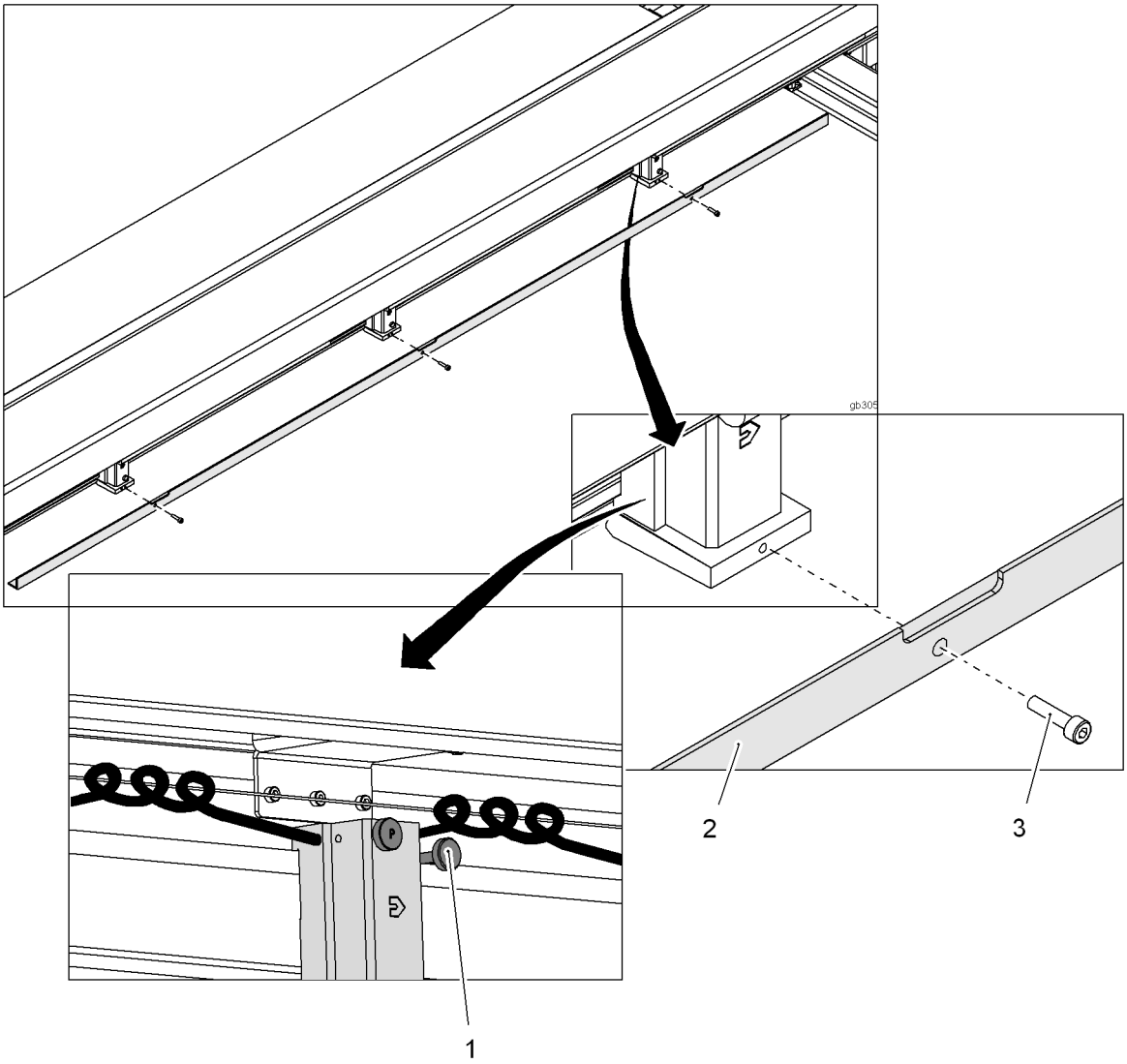

Fig. 4-29 Feed guide rail

1 Fixing of the feeding clamp
2 Feed guide rail
3 Fastening screw, self-locking

Assemble feed guide rail

⇨ Use SHIFT STOP to switch the cutter off
⇨ Loosen the fixing of the feeding clamps
⇨ Position the feeding clamps
⇨ Loosely screw the feeding guide rail to all feeding clamps using the supplied, self-locking fastening screws
⇨ Tighten the fixing of the feeding clamps
⇨ Use F1 to switch on the cutter
⇨ Lower (1-7-11-6) and raise (1-7-11-7) the feeding guide rail several times for inspection purposes

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4.8.3 Feeding options

The feed is controlled via the communication software. The following factors can be preset via the cutter control unit (see chapter "Menu description"):

- Speed settings
- Acceleration settings
- Feeding mode (vacuum settings)
- Function of the feeding clamps

4.9 Automatic tool initialisation

Important !

Manual initialisation is described in the operating manual of the relevant tool. See chapter "Tools".

4.9.1 Description

The following tools can be initialised using the automatic tool initialisation:

- Kiss cutting tool (**without glide element**) (KCT)
- Universal cutting tool (UCT)
- Electrically oscillating cutting tool (EOT)
- Pneumatically oscillating cutting tool (POT
- Driven rotary cutting tool (DRT)
- Router

Attention !

Danger of the cutter being damaged

Only use the automatic tool initialisation for compatible tools. Carry out manual initialisation for other tools that are not listed.

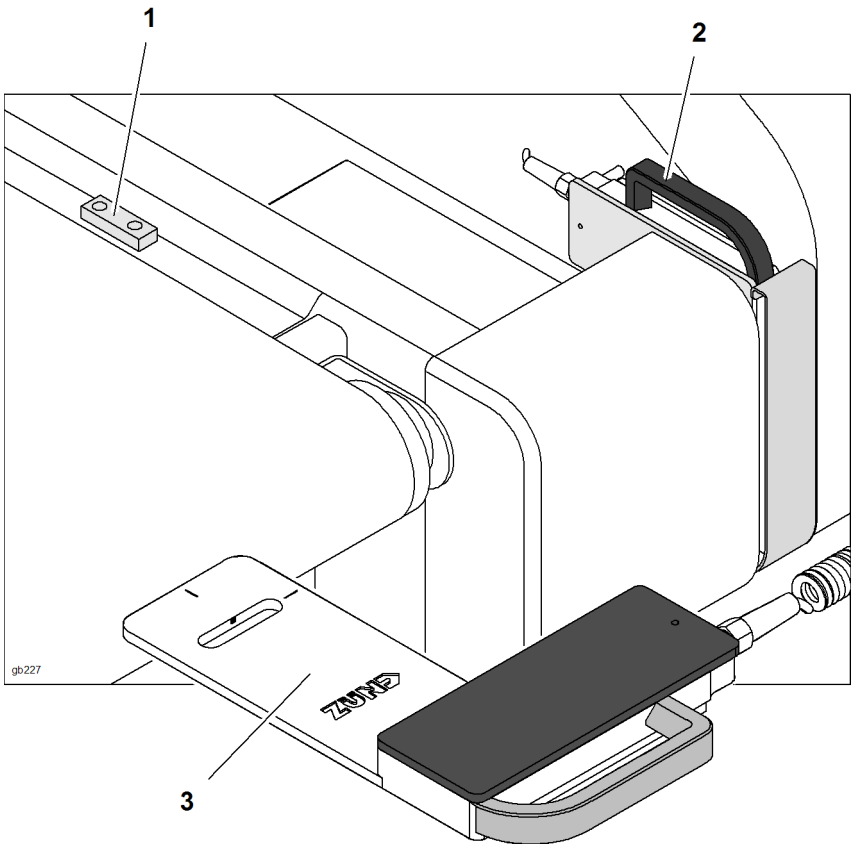

Fig. 4-30 Automatic tool initialisation

1 Holder
2 Rest
3 Automatic tool initialisation

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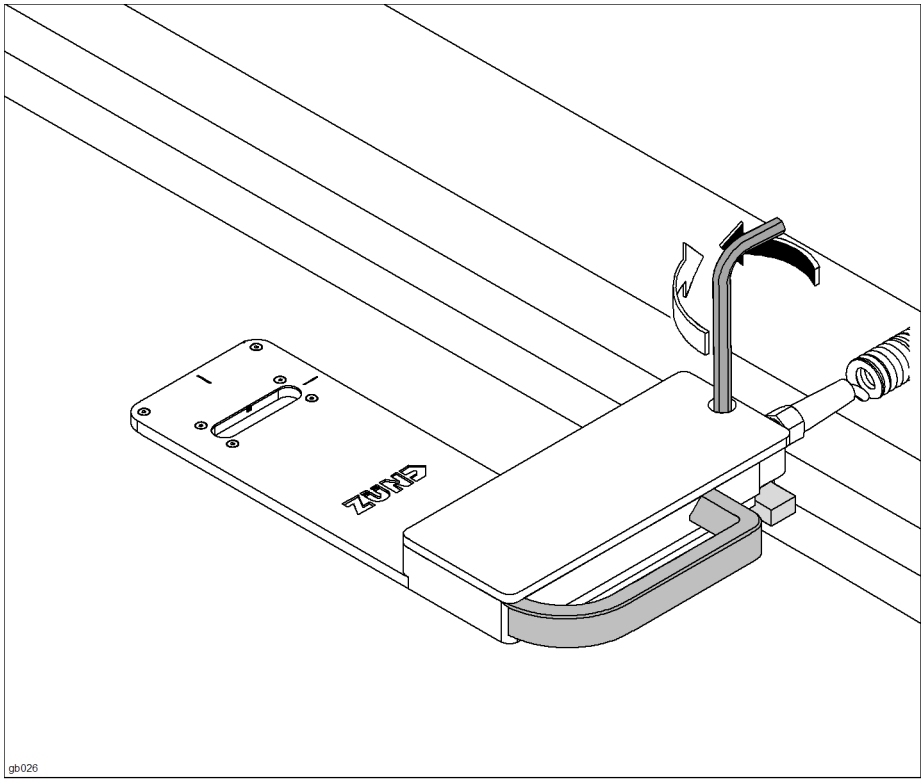
4.9.2 Setting the height

Important !

Ensure that the automatic tool initialisation lies planar on the cutting base (conveyor belt). Adjust the height if necessary.



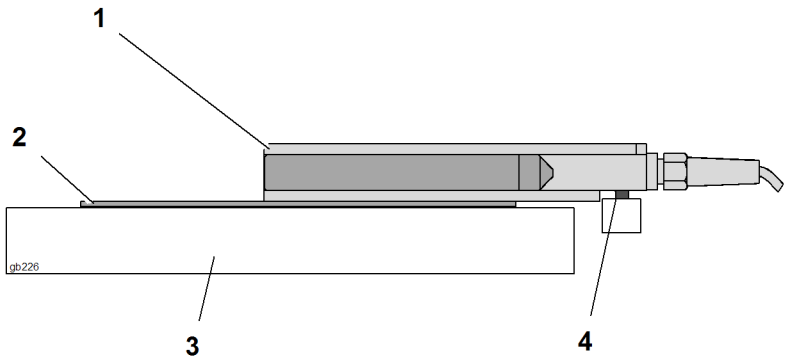


Fig. 4-31 Setting the height

1 Automatic tool initialisation
2 Cutting base
3 Table
4 Adjusting screw

⇨ Turn the adjusting screw anti-clockwise
⇨ Place the automatic tool initialisation on the cutting base
⇨ Use the adjusting screw to set the gradient so that the automatic tool initialisation is in a plane position on the cutting base

4.9.3 Initialisation

Example: Module 2; electrically oscillating tool

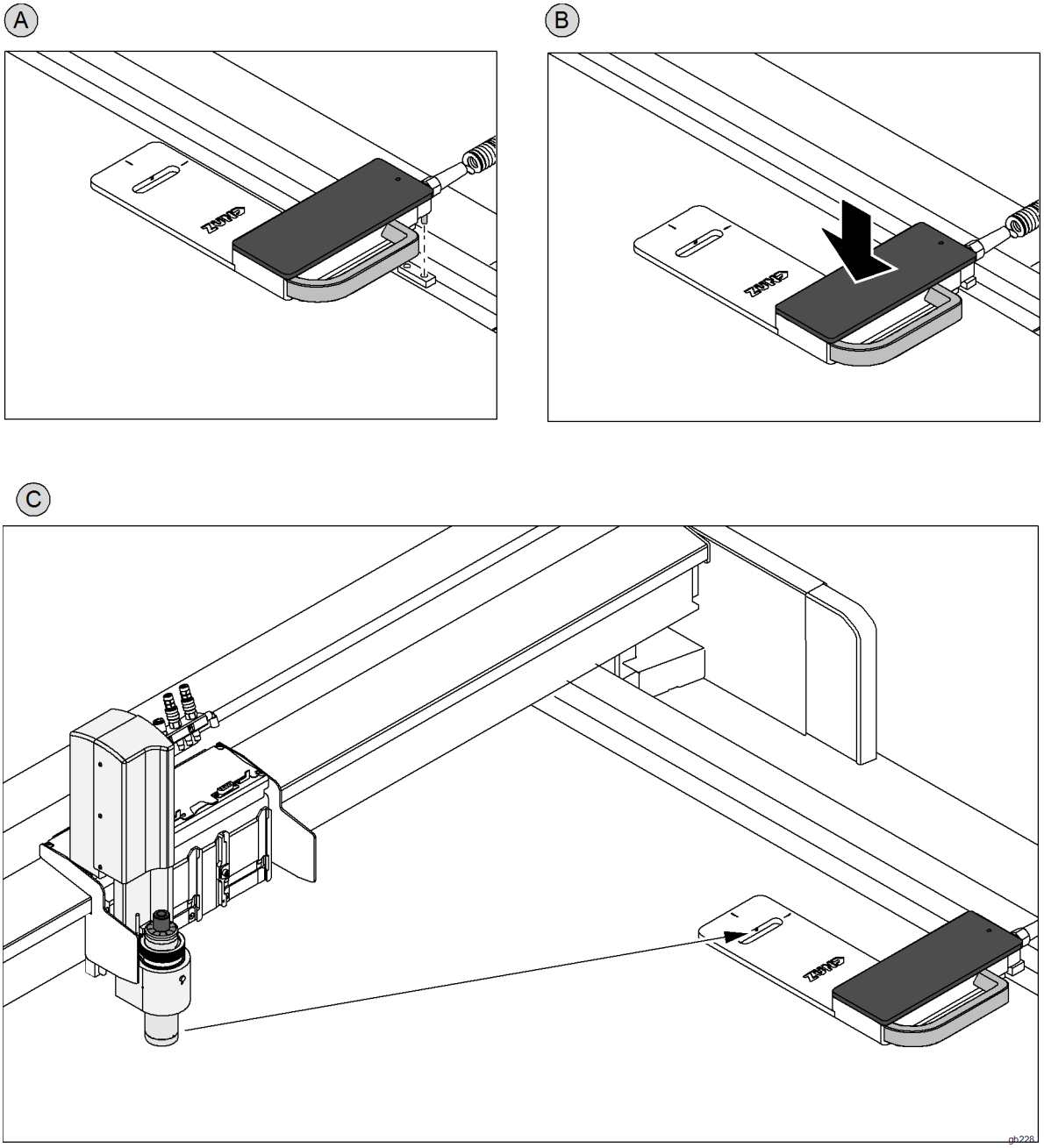


Fig. 4-32 Initialisation

⇨ Use the travel keys to move the module into the centre of the cutter

⇨ Remove the automatic tool initialisation from the holder and position it in the guide on the table.

⇨ Press the tool initialisation to be planar on the cutting base

⇨ Use *Auto init*1-1-1-2-2 to select the function for automatic initialisation

✓ The tool is positioned via the automatic tool initialisation and the initialisation process is started. The value that is determined is saved for the specific tool.

4.10 Laser pointer, reference point

Attention !

Laser class 2. Looking directly into laser beam will damage the eyes.

Avoid looking directly into the laser beam.

The laser pointer is an optical instrument for visually determining the reference point. It is attached to the module.

4.10.1 Laser pointer settings

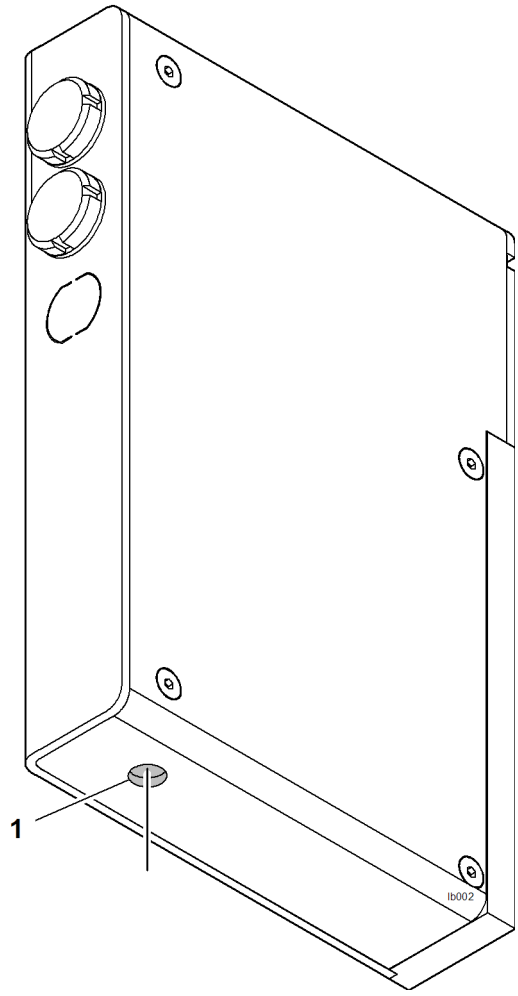


Fig. 4-33 Laser pointer settings

1 Connection 1 - port 1
2 Connection 2 - port 2
3 Connection 3 - port 3
4 Laser beam exit

4.10.2 Reference point settings

A reference point can be defined on the working area of the cutter.

This reference point is the starting point for the processing procedure and corresponds to the zero point of the processing file.

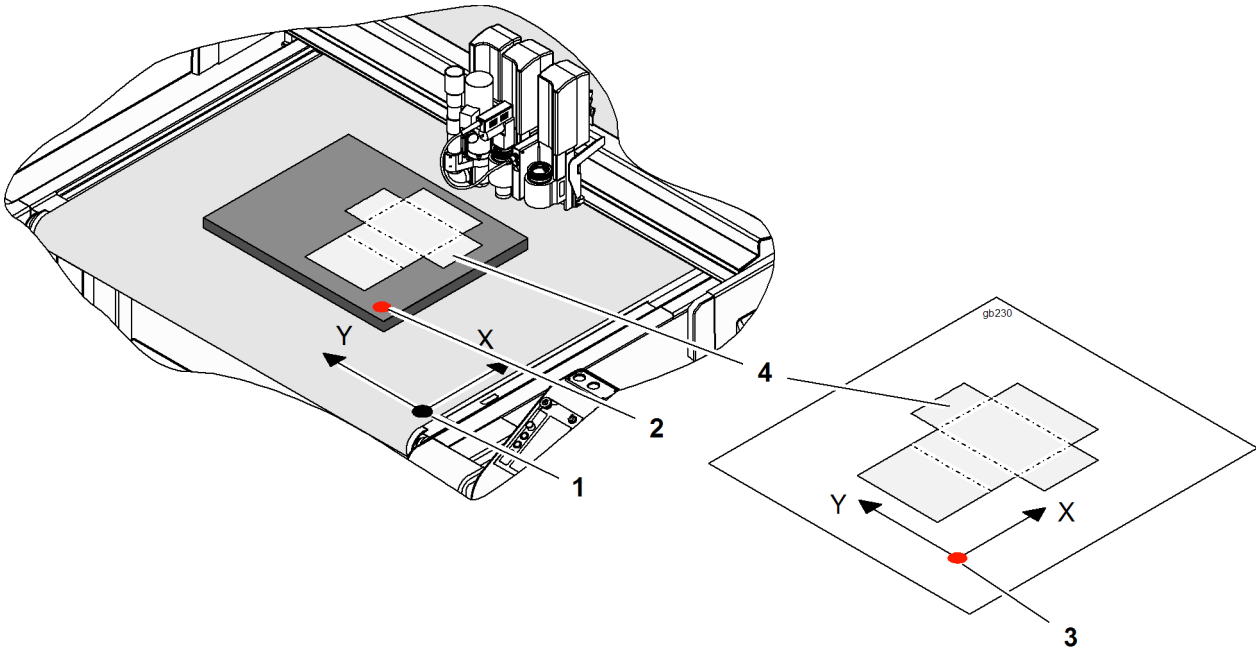


Fig. 4-34 Reference point settings

1 Working area zero point
2 Reference point settings
3 Processing file zero point
4 Processing pattern

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4.10.3 Choose laser pointer as pointer type

Both the current tool and the laser pointer can optionally be defined as the pointer for defining the reference point.

⇨ Select the function *Pointer type* 1-5-2-1-1

⇨ Select the laser pointer

✓ The laser pointer has been selected and saved as the pointer

4.10.4 Define reference point

Example: Active tool = EOT, position: *Tool* 2-1

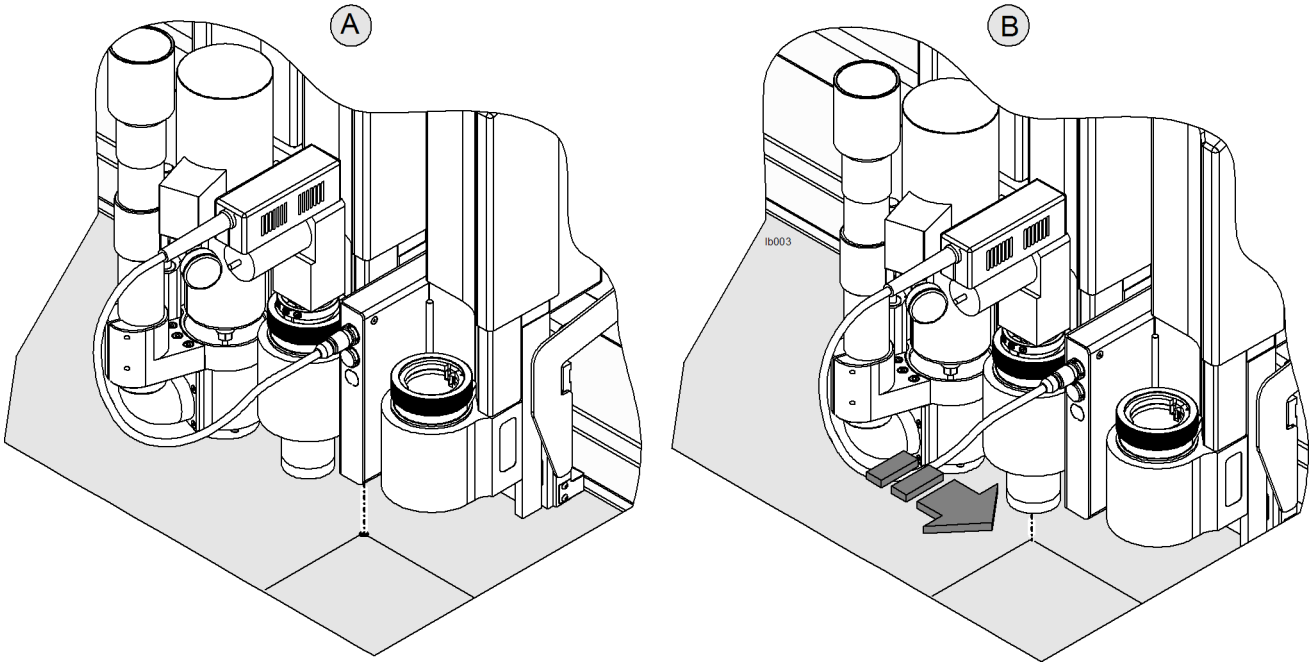

Fig. 4-35 Define reference point

⇨ Select the function *Define reference* 2-1-1-3

⇨ Use the travel keys to move to the required reference point on the working area. Choose OK to confirm

✓ The reference point is saved for the duration of time that the cutter is switched on. This reference point now applies as the start point for the material processing.

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4.11 Module carriage slot protective plate

Attention !

Risk of being crushed

The module carriage area is not monitored by safety devices.

- Do not reach into the active area of the cutter during operation
- Do not protect occupied slots with slot protective plates

On the one hand, the slot protective plate is used as a safety device, and on the other it is used to protect a free module slot from contamination. Two slot protective plates are supplied.

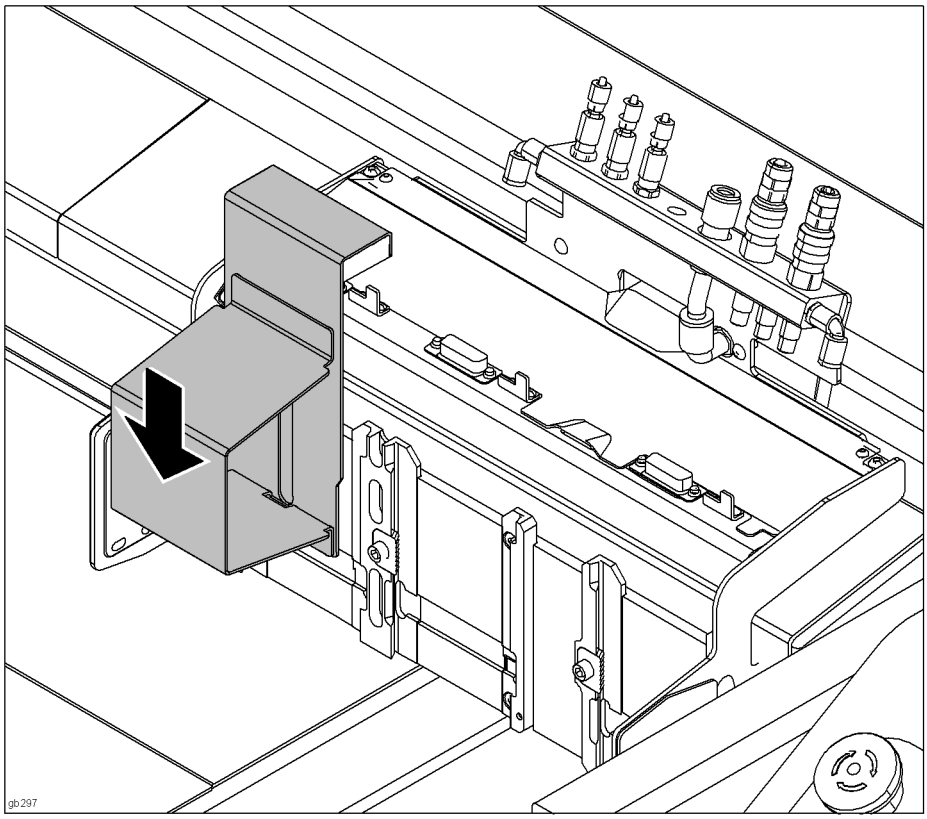

Fig. 4-36 Slot protective plate

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4.12 Module and tool holder*

Attention !

Always store any unused tools and modules correctly, in order to avoid any damage to them.

Store any unused modules and tools in the module and tool holder. The module and tool holder has space for two tools and two modules.

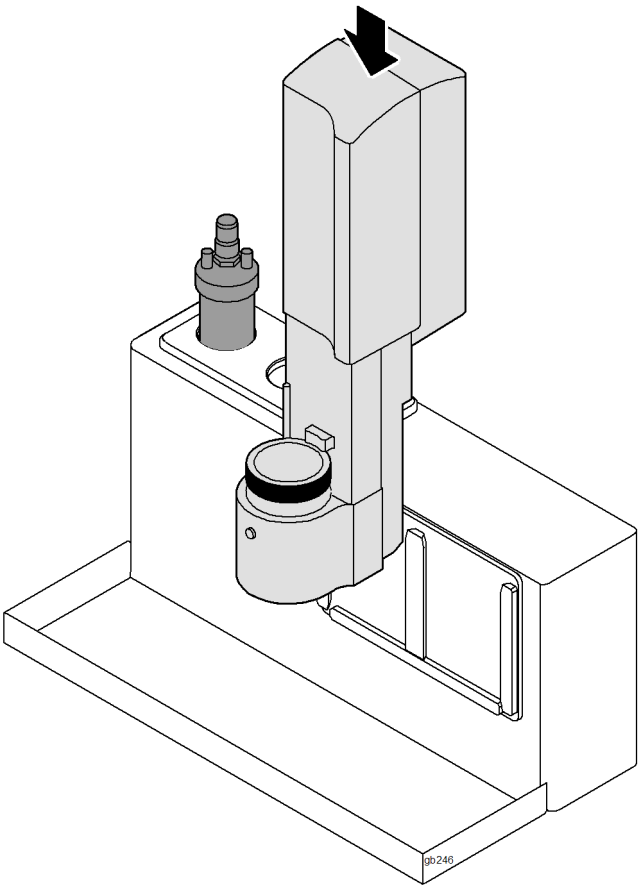


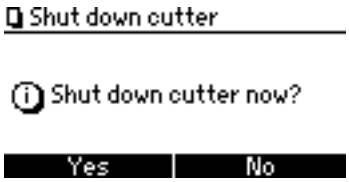
Fig. 4-37 Module and tool holder

4.13 Switch off the machine

To switch off the machine, proceed as follows:

⇨ Switch the cutter into the operating status OFFLINE

⇨ Select the function *Shut down cutter*12 from the menu or press the key combination SHIFT + STOP .



⇨ Use **Yes** to confirm

⇨ The start page appears on the display.

⇨ Switch off the machine using the main switch. If necessary, secure the main switch using a lock to protect the machine against incorrect commissioning.

⇨ Clean the machine to remove dust and material residues

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5 Description of menu

Valid from firmware 1.40

5.1 General

The menu description contains all menu entries and commands. However, entries which repeat periodically (module 1 - module 4) are only listed once.

Explanations on module/tool-specific menu entries can be found in the operating manual of the respective module/tool insert.

Menu entries are displayed/faded out depending on the module/tool combination.

5.2 Menu structure

The settings for modules and tools are arranged as they are presented in reality. Tools are used in a module (e.g. UM) and routers, knives, pens etc. are used in the tools.

The following menus appear in the main menu:

Cutter setup

Module selection, Tool selection, Initialisation, General cutter settings

Job setup

Reference points, window

Functions

Vacuum, Components, Router option, Tests

User settings

User level, password

Communication settings

Processing software communication settings (front end) - Cutter

Operating unit

Language, function keys, date/time

System info settings

Information on the cutter, operating hours

Service

Update firmware

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5.3 Description of menu

Main menu

Highest level of the menu structure

1 Cutter setup

The following settings for the configuration of the cutter are carried out in this menu:

- Tool settings
  - Manual, automatic initialisation
  - Moving speeds
  - Acceleration settings
- Module settings
  - Tool assignment
  - Work modes
  - Settings for the different movement axes

1-1 Module 1

Menu with settings for module 1.

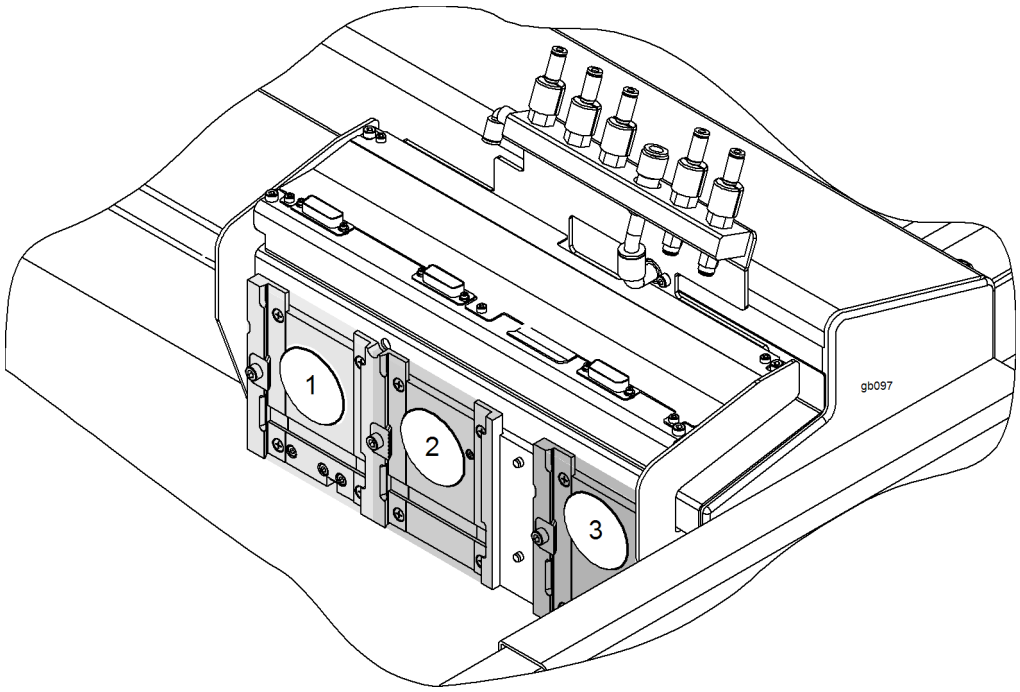

Fig. 5-1 Module 1 - 3

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1-1-1 **Tool pos. 1**

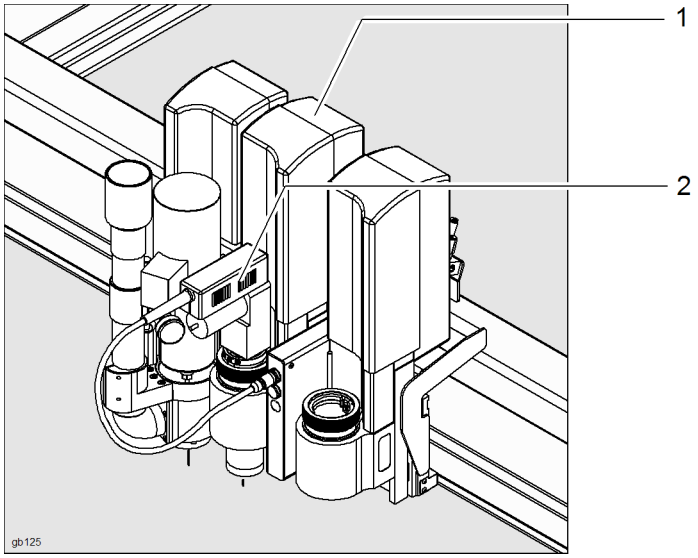

Fig. 5-2 Tool slot, tool assignment e.g. Module 2, tool 1

1 Module 2 (UM) = tool slot 2
2 Oscillating tool = tool 1

= **Tool pos. 1**

Each module consists of up to four tools (e.g. PUM). The first figure of the menu entry shows the tool slot of the module, the second figure shows the tool position.

The menu entries of the tools 11 - 14; 21 - 24; 31 - 34; (41 - 44)* are identical.

The allocations and settings of the tools are carried out in the following submenus.

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1-1-1-1 Select tool

Assign the tool that is used in the module.

For the attachment/selection of a new tool see chapter "Controls and operation", "Tool handling"

1-1-1-2 Initialisation

Setting of the tool working height. Further tool-specific information relating to the initialisation can be found in the operating manual of the respective tool type.

1-1-1-2-1 Define Z init pos

Determining the Z position as the initialisation position for the current tool

1-1-1-2-2 Auto init

Automatic initialisation with AKI

⇨ Position auto init tool on the work surface

⇨ Start function. The selected tool moves via the initialisation tool and starts the initialisation procedure

✓ The value that is determined is saved for the specific tool.

1-1-1-2-3 Up Z pos

Value for setting the tool position when the tool is raised (procedure).

To increase cutter efficiency, this position should only be set as high as is necessary.

1-1-1-2-4 Test cut

Carry out a quadratic test cut (20 mm x 20 mm). The zero point of the square is the lower right-hand corner. The test cut is carried out in the current tool position.

Procedure

⇨ Place the material to be processed on the working surface

⇨ Select the function

⇨ Switch on vacuum (VAC - 2)

⇨ Use the travel keys to position the tool over the current material to be processed. Choose OK to confirm.

⇨ Check the test cut. If necessary, redefine the the zero point on the Z-axis or correct it using the *Z Offset* function

1-1-1-2-5 Z Offset

Value for adjusting the processing depth by ±1.5 mm

The Z offset function moves the *Down Z pos* by the value that is entered.

1-1-1-2-6 Init height

Define the height of the suction unit during processing

Procedure

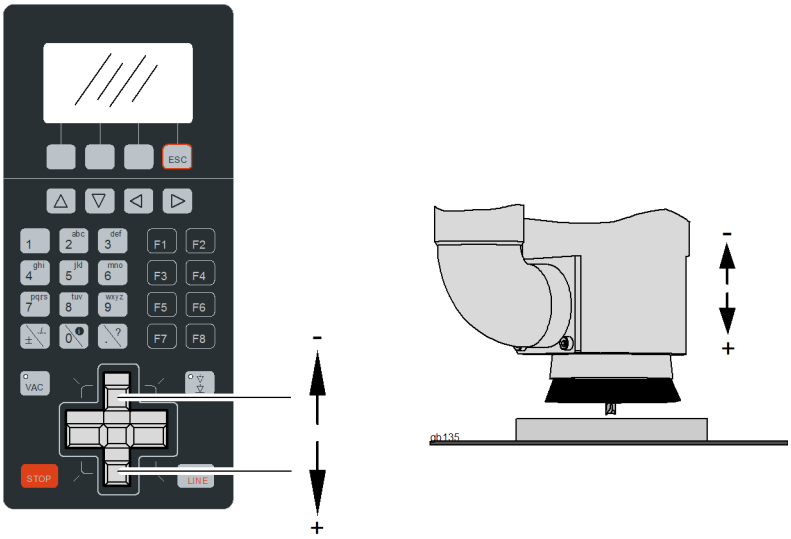

Fig. 5-3 Init height

⇨ Select function

⇨ Use the travel keys to move to the suction height and confirm the dialogue using OK

1-1-1-3 Tool setup

Tool-specific settings. These settings are saved for the assigned tool.

1-1-1-3-1 Setup

Tool-specific settings

1-1-1-3-1-1 Tool connector

Determining the connection of the tool

1-1-1-3-1-1 Router converter

Assign the connected router converter

1-1-1-3-1-1 Infeed angle

Setting of the infeed angle for the VCT.

The selection of the infeed angle ensures that the blade automatically penetrates into the material at the correct angle. The penetration point can be optimised using the functions X-correction/Y-correction (see section "2.10, X-/Y-correction"). The X/Y correction value depends on the infeed angle and is selected automatically.

1-1-1-3-1-2 Switch-off time

The tool switches off after a specified period of time without the receipt of data

1-1-1-3-1-3 Rpm

Setting of the motor spindle speed. The adjustable speed is dependent on the spindle type.

1-1-1-3-1-4 After on delay

Waiting time until the tool has reached the nominal frequency

1-1-1-3-1-5 After off delay

Waiting time until the tool stands still.

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1-1-1-3-1-6 Continuous Path

Continuous path switched on

The speed is the same in all directions. The speed can be calculated using the setting value from *Down X&Y* 1-1-1-3-2-2.

Continuous path switched off

The speed is calculated from the set axis speed in X and Y direction.

1-1-1-3-1-7 Start with man. Init

Setting of whether the motor spindle is switched on or off during the manual initialisation.

1-1-1-3-1-8 Stop angle

If a change in direction larger than the set angle is determined during movement then the speed is reduced to zero before movement is started in the new direction.

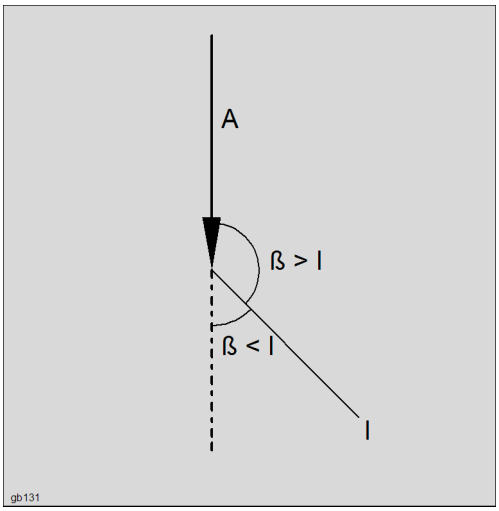

Fig. 5-4 Stop angle

A Processing direction
ß Direction change (angle)
I Stop angle

1-1-1-3-2 Speed settings

Setting of the movement speeds for the tool that is in use. The possible moving speed is dependent on the knife/router/pen being used and on the material to be processed

1-1-1-3-2-1 Up X&Y

Moving speed in the directions X and Y when the tool is raised

Adjusting value: 1 - 1,000 mm/s

1-1-1-3-2-2 Down X&Y

Moving speed in the directions X and Y when the tool is lowered

Adjusting value: 1 - 1,000 mm/s

1-1-1-3-2-3 Lift Z

Speed when raising the tool

1-1-1-3-2-4 Lower Z

Speed when lowering the tool

1-1-1-3-3 Acceleration settings

Setting of the tool acceleration. The acceleration is dependent on the knife/router/pen being used and on the material to be processed

1-1-1-3-3-1 Up X&Y

Acceleration of the tool in the X/Y direction when the tool is raised

Setting range: 1 - 10 m/s^2

1-1-1-3-3-2 Down X&Y

Acceleration of the tool in the X/Y direction of the lowered tool

Setting range: 1 - 10 m/s^2

1-1-1-3-3-3 Lift Z

Acceleration of the Z axis when raising the tool

1-1-1-3-3-4 Lower Z

Acceleration of the Z axis when lowering the tool

1-1-1-3-4 Z axis settings

Menu for setting the Z axis parameters.

1-1-1-3-4-5 Down Z pos

Setting of the cutting depth/the tool position when the tool is lowered.

This position should only be set as deep as is necessary in order to avoid damage to the cutting base.

1-1-1-3-4-6 Max Z down

Limitation of the *Down Z pos* for the protection of the work surface. This value specifies the maximum possible cutting depth. This setting is only valid for the automatic initialisation.

1-1-1-3-4-7 Pos / Pressure mode

Menu for modules which can be used in both the position mode and the pressure mode (e.g. universal module)

Position mode:

In the position mode, the cutting depth is defined using the zero point of the Z axis. The module moves to the set zero point irrespective of the pressure/the cutting depth

Pressure mode:

The cutting depth is the result of a set pressure which is exerted on the tool by the module.

The module moves into the material until the preset pressure is reached.

Initialisation generally takes place on the material surface. Then set the cutting depth with the *Down Z pos* function 1-1-1-3-4-2

1-1-1-3-4-7-1 Pos / Pressure mode

Display of the current mode. Use the ▷ key to change to the selection menu and select the required mode.

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1-1-1-3-4-7-2 X&Y pressure

Setting of the pressure in the X and Y direction.
Setting range: 2 - 20 kg

1-1-1-3-4-7-3 X pressure

Setting of the pressure for the X axis
Setting range: 2 - 20 kg

1-1-1-3-4-7-4 Y pressure

Setting of the pressure for the Y axis
Setting range: 2 - 20 kg

1-1-1-3-4-8 Auto init options

Menu for the determination of the zero point with the automatic knife initialisation.
For further information see chapter "Controls and operation" in the operating manual

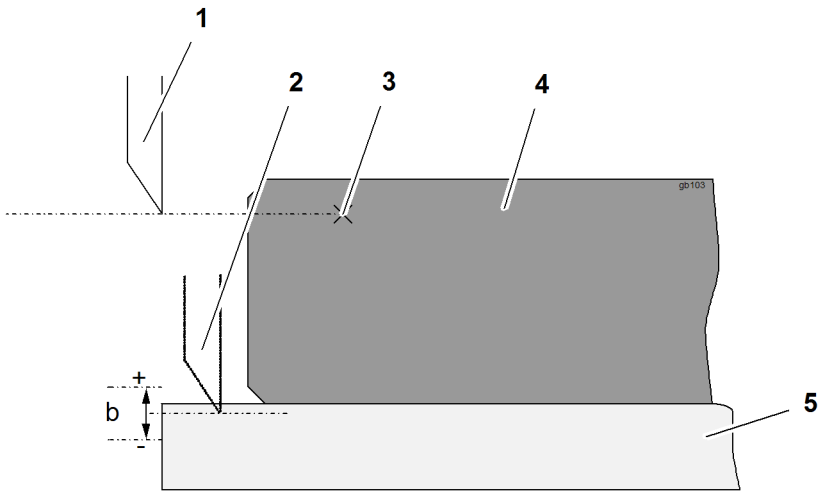

Fig. 5-5 Init tool settings

1 Zero point (light barrier height)
2 Knife in operating position
3 Light barrier
b Init tool offset
4 AKI2
5 Cutting base

1-1-1-3-4-8-1 Init tool offset

Correction factor for setting the processing depth. This value can be used to adjust the cutting depth by ±1.5 mm.

1-1-1-3-4-9 Init Z pos

Z position after initialisation. This value is determined via the functions *Define Z init pos* 1-1-1-2-1 or *Auto init* 1-1-1-2-2.

1-1-1-3-5 T axis settings

Settings of the T axis. E.g. universal module

1-1-1-3-5-1 Auto lift-up angle

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If a direction change of more than the set value is detected during processing, the tool remains in position, is raised, turns into the new processing direction, is lowered again and accelerates.

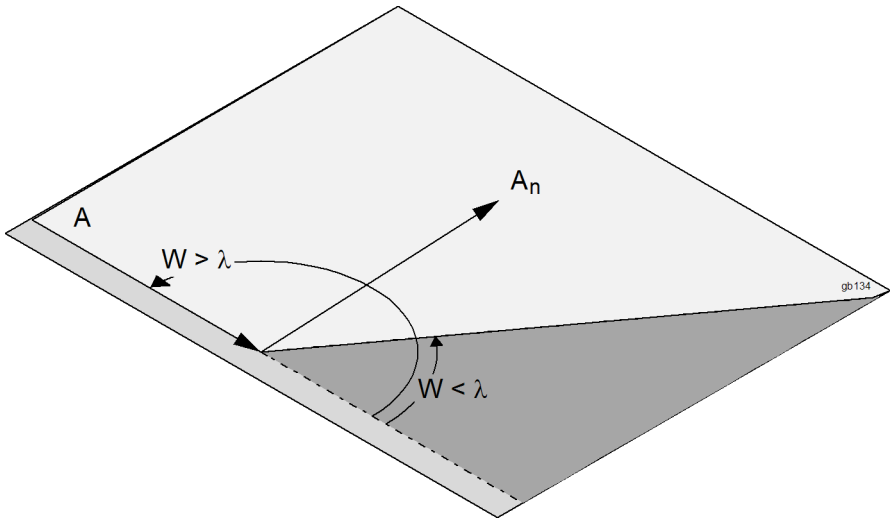

Fig. 5-6 Auto lift-up angle

A Processing direction
λ Auto lift-up angle
W Movement angle
An Example: Movement angle following change in direction

1-1-1-3-5-2 T axis rotation

Switching the tangential rotation on and off.

⇨ Switch the function for the rotation of the T axis off if it is not required for the application (e.g. use of marking tools)

1-1-1-3-5 Dust collector settings

Setting of the parameters for modules with automatic dust collection

1-1-1-3-5-2 position

Display of the current height of the suction unit

1-1-1-3-5-3 Offset

Correction value for the adjustment of the position of the suction unit during processing

1-1-1-3-5-4 Offset

Switch *Offset*1-1-1-3-5-3 on/off

1-1-1-3-6 Tool delay settings

Setting of the tool-specific delay times.

1-1-1-3-6-1 Before down delay

Delay before lowering the tool

1-1-1-3-6-2 After down delay

Delay after lowering the tool

1-1-1-3-6-3 After down action delay

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Delay time for tools which carry out an action after the lowering. E.g. passepartout tool.

1-1-1-3-6-4 After down delay

Delay before lifting the tool

1-1-1-3-6-5 After up delay

Delay after lifting the tool

1-1-1-3-6-6 Before up action delay

Delay time before lifting when the tool carries out an additional action. E.g. passepartout tool.

1-1-1-3-6-7 Up Impulse delay

Display of the delay before raising the tool (PUM)

1-1-1-3-6-8 Up Impulse length

Display of the impulse duration for lifting the tool (PUM)

1-1-1-4 Correction

Description to follow

1-1-1-4-1 Correction

Activate/deactivate knife connection accuracy

1-1-1-4-2 Correct X

Correction value for the compensation of the tool tolerance/optimisation of the infeed angle. Refer to *Test cut*1-1-1-4-4 for the determination of the correction value

1-1-1-4-3 Correct Y

Correction value for the compensation of the tool tolerance/optimisation of the infeed angle. Refer to *Test cut*1-1-1-4-4 for the determination of the correction value

1-1-1-4-4 Test cut

Correction values, general

Important !

The penetration point and/or the cut direction of each test cut act as measuring points for the calculation of the correction values. You should therefore observe exactly where the blade penetrates when cutting the 4 lines and mark the penetration points.

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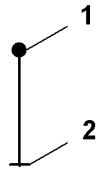	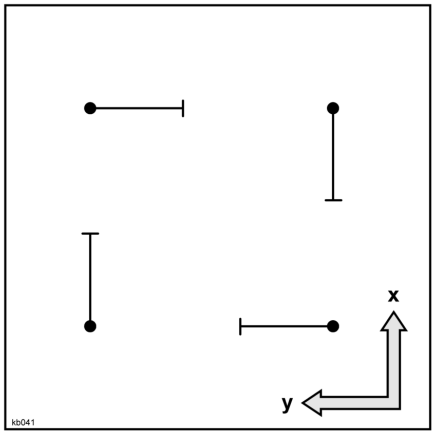	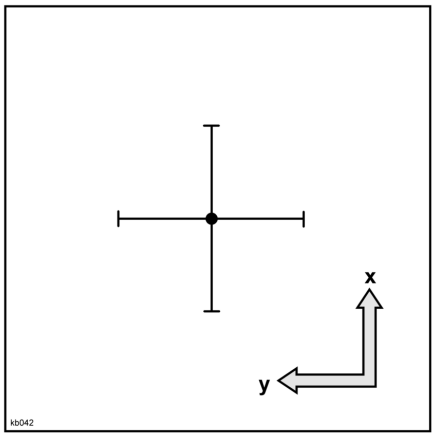
Example: **1** Start of cut (penetration point) **2** End of cut	Cutting diagram with all correction values set to 0	Cutting diagram once the alignment process has been successfully completed

Preparation

⇨ Place paper on the cutting support

⇨ Switch vacuum on

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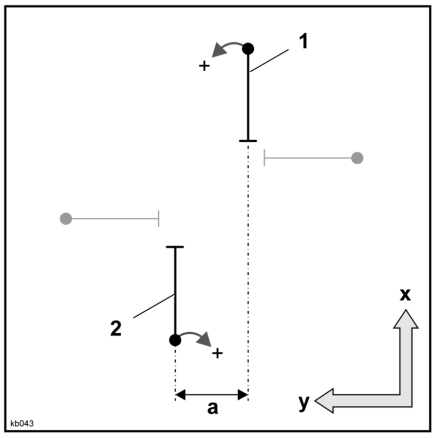
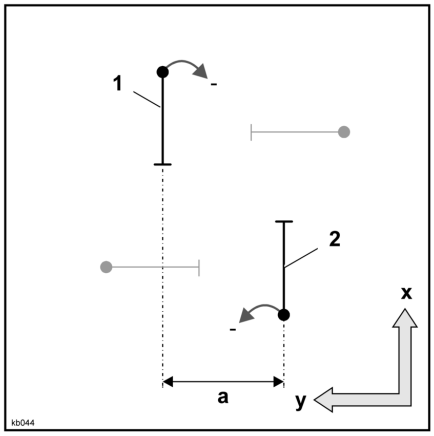
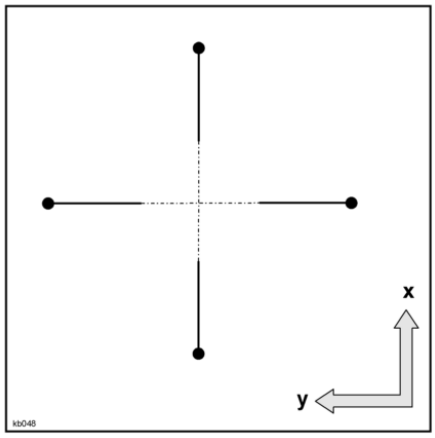
Correct Y

When the axes are aligned, the cuts are moved towards the coordinate system axes until each of the parallel cuts lie on the same axis.

Measure and calculate distance a (mm/in) of the parallel cuts to the X axis as follows:

⇨ Start the *Test cut*1-1-1-4-4 function

		
Option 1: line 1 has to be moved to the left and/or line 2 has to be moved to the right to lie along the same line. **Y1=Y2-a/2**	Option 2: line 1 has to be moved to the right and/or line 2 has to be moved to the left to lie along the same line. **Y1=Y2+a/2**	Result: The cuts lie along one line
a...Distance in mm [in] Y1...calculated value Y2...current value from *Correct Y*1-1-1-4-3		

⇨ Enter the calculated value Y1 in the *Correct Y* 1-1-1-4-3 field

⇨ Perform a test cut and recalculate the correction value if necessary

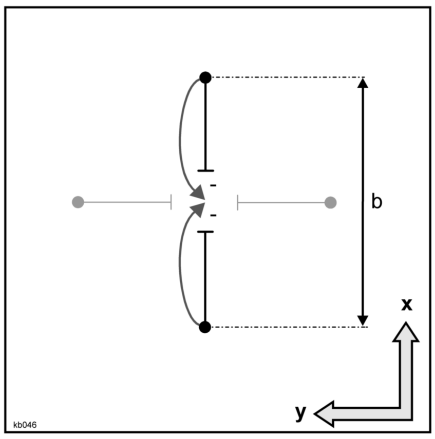
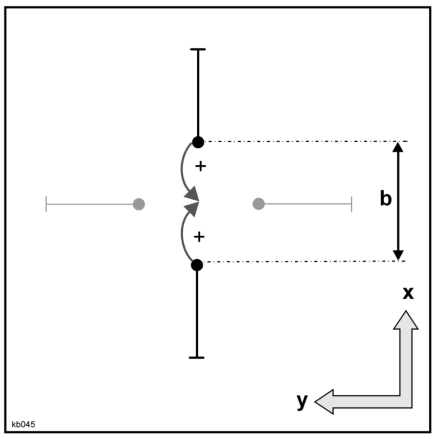
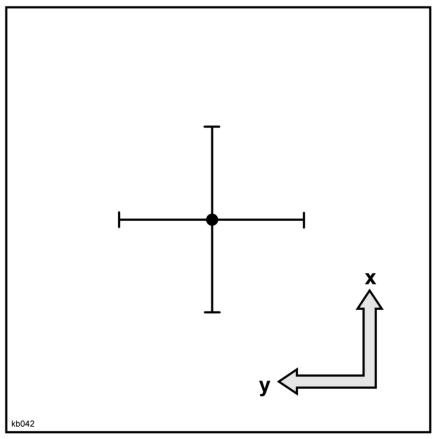
✓ The axes alignment process is complete when the cuts lie on the same line (tolerance: ± 0.1 mm). Where necessary, check this using a magnifying glass.

Correct X

When a centre alignment is carried out, the cuts are moved towards the coordinate system centre until the cut and the coordinate system are congruent.

Measure and calculate distance b (mm/in) (penetration point line 1 to penetration point line 2) of the parallel cuts to the X axis as follows:

⇨ Start the *Test cut*1-1-1-4-4 function

		
Option 1: The distance between the penetration points is greater than the distance between the ends of the cuts **X1=X2-b/2**	Option 2: The distance between the penetration points is smaller than the distance between the ends of the cuts **X1=X2+b/2**	Result: The penetration points are positioned precisely in the centre
b...Distance in mm [in] X1...calculated value X2...current value from *Correct X*1-1-1-4-2		

⇨ Enter the calculated value X1 in the *Correct X* 1-1-1-4-2 field

⇨ Perform a test cut and recalculate the correction value if necessary

✓ The centre alignment is complete when both penetration points are precisely in the centre (tolerance: ± 0.1 mm). Where necessary, check this using a magnifying glass

1-1-1-4-5 Test tool rotation

Test cut for the alignment of the T axis. Description to follow

1-1-1-4-6 Cut polygon test

Test cut in the shape of an octagon. Description to follow.

1-1-1-4-7 Cut rectangle test

Description to follow

1-1-1-5 Router 1

Router 1

1-1-1-5 Router 2

Router 2

1-1-1-6 T-75 module

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Not active

1-1-2 **Tool pos. 2**

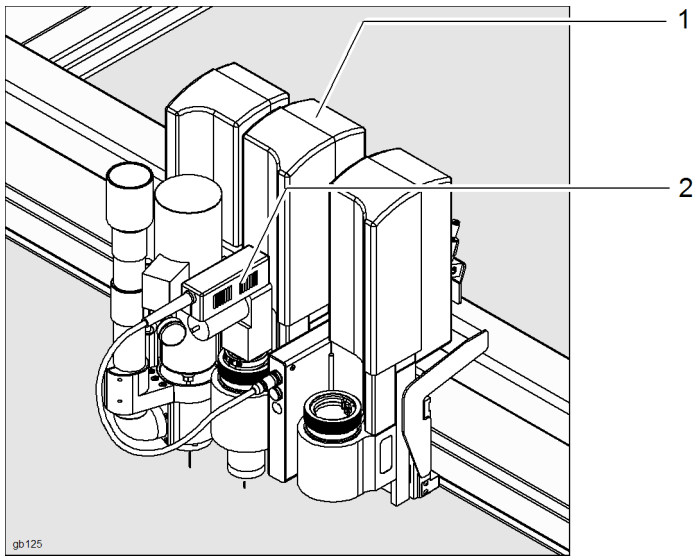

Fig. 5-7 Tool slot, tool assignment e.g. Module 2, tool 1

1 Module 2 (UM) = tool slot 2
2 Oscillating tool = tool 1

= **Tool pos. 1**

Each module consists of up to four tools (e.g. PUM). The first figure of the menu entry shows the tool slot of the module, the second figure shows the tool position.

The menu entries of the tools 11 - 14; 21 - 24; 31 - 34; (41 - 44)* are identical.

The allocations and settings of the tools are carried out in the following submenus.

1-1-3 **Tool pos. 3**

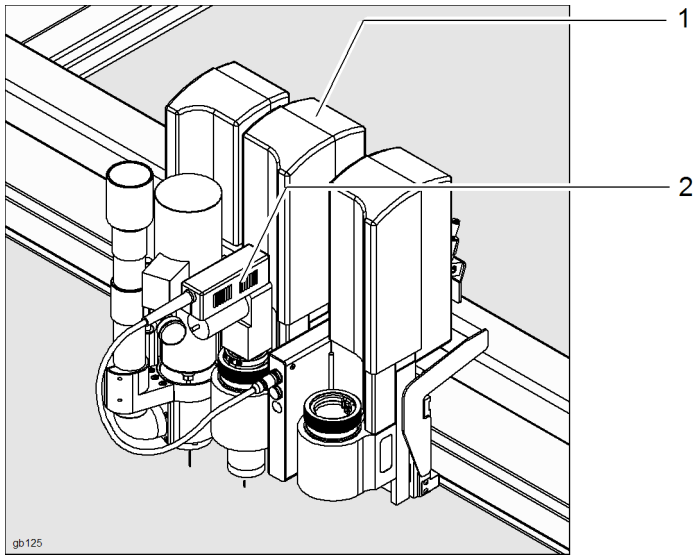

Fig. 5-8 Tool slot, tool assignment e.g. Module 2, tool 1

1 Module 2 (UM) = tool slot 2
2 Oscillating tool = tool 1

= **Tool pos 1**

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Each module consists of up to four tools (e.g. PUM). The first figure of the menu entry shows the tool slot of the module, the second figure shows the tool position.

The menu entries of the tools 11 - 14; 21 - 24; 31 - 34; (41 - 44)* are identical.

The allocations and settings of the tools are carried out in the following submenus.

1-2 Module 2

Menu with settings for module 2.

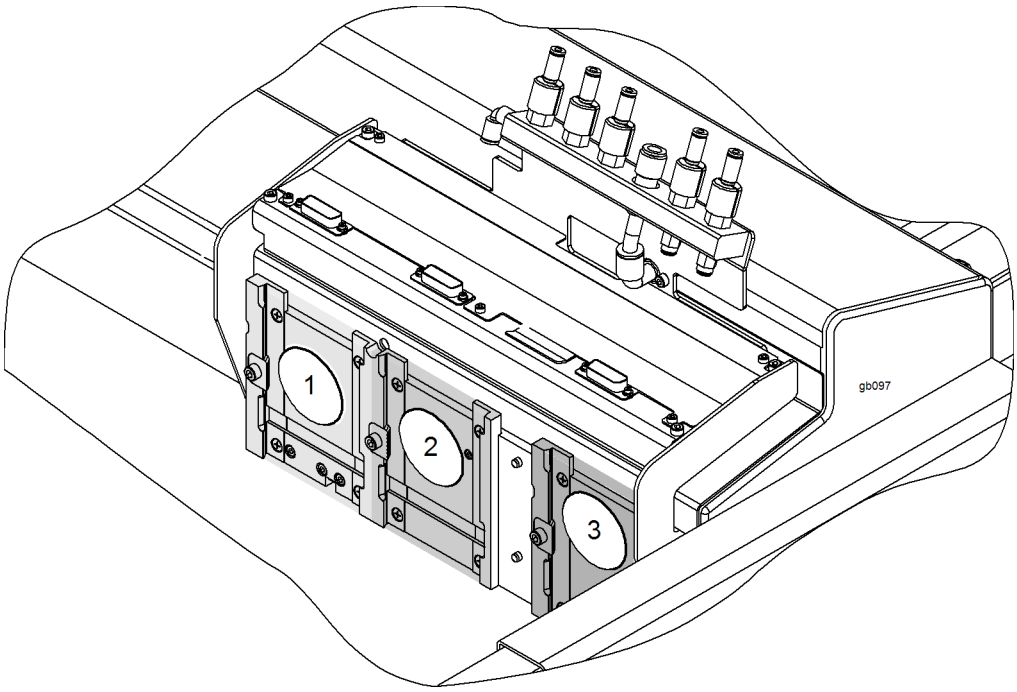

Fig. 5-9 Module 1 - 3

1-2-1 Tool pos. 1

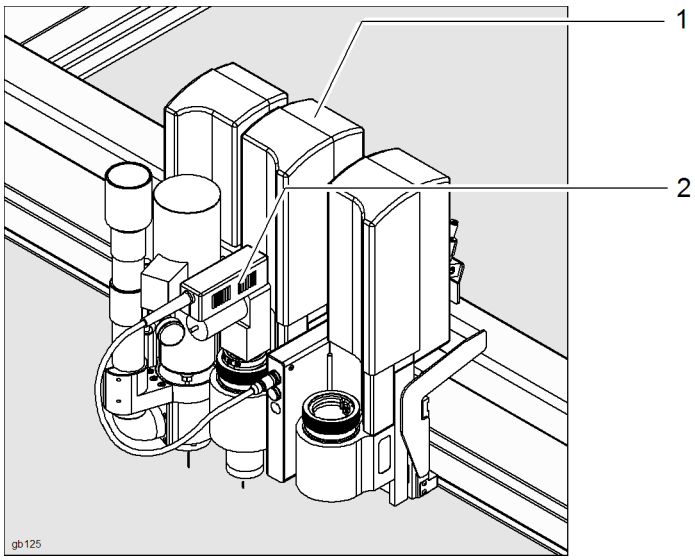

Fig. 5-10 Tool slot, tool assignment e.g. Module 2, tool 1

1 Module 2 (UM) = tool slot 2

2 Oscillating tool = tool 1

= Tool pos. 1

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Each module consists of up to four tools (e.g. PUM). The first figure of the menu entry shows the tool slot of the module, the second figure shows the tool position.

The menu entries of the tools 11 - 14; 21 - 24; 31 - 34; (41 - 44)* are identical.

The allocations and settings of the tools are carried out in the following submenus.

1-2-2 Tool pos 2

See tool pos 1

1-2-3 Tool pos 3

See tool pos 1

1-3 Module 3

Menu with settings for module 3.

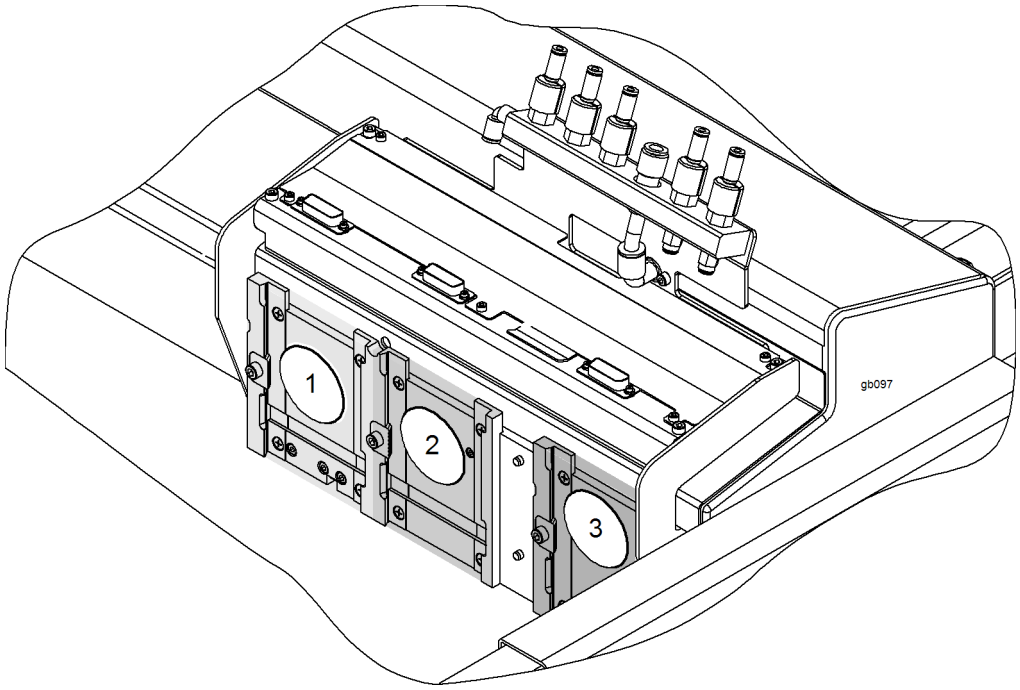

Fig. 5-11 Module 1 - 3

1-3-1 Tool pos. 1

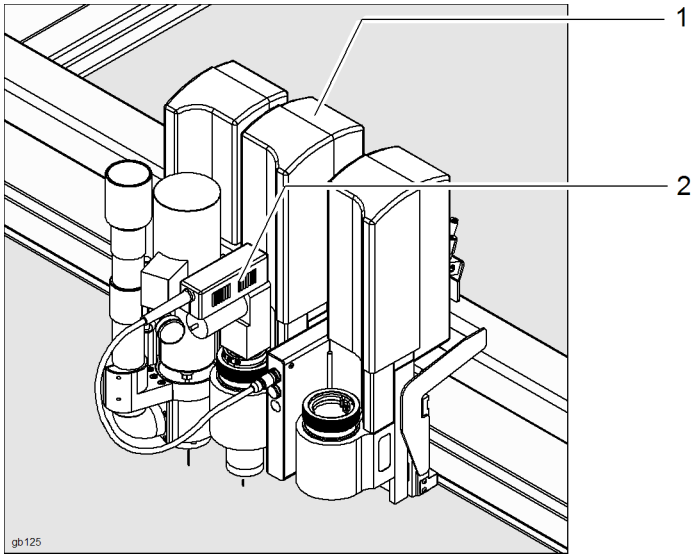

Fig. 5-12 Tool slot, tool assignment e.g. Module 2, tool 1

1 Module 2 (UM) = tool slot 2
2 Oscillating tool = tool 1

= Tool pos. 1

Each module consists of up to four tools (e.g. PUM). The first figure of the menu entry shows the tool slot of the module, the second figure shows the tool position.

The menu entries of the tools 11 - 14; 21 - 24; 31 - 34; (41 - 44)* are identical.

The allocations and settings of the tools are carried out in the following submenus.

1-3-2 **Tool pos 2**

See tool pos 1

1-3-3 **Tool pos 3**

See tool pos 1

1-4 **Module 4**

Menu with settings for module 4 (optional)

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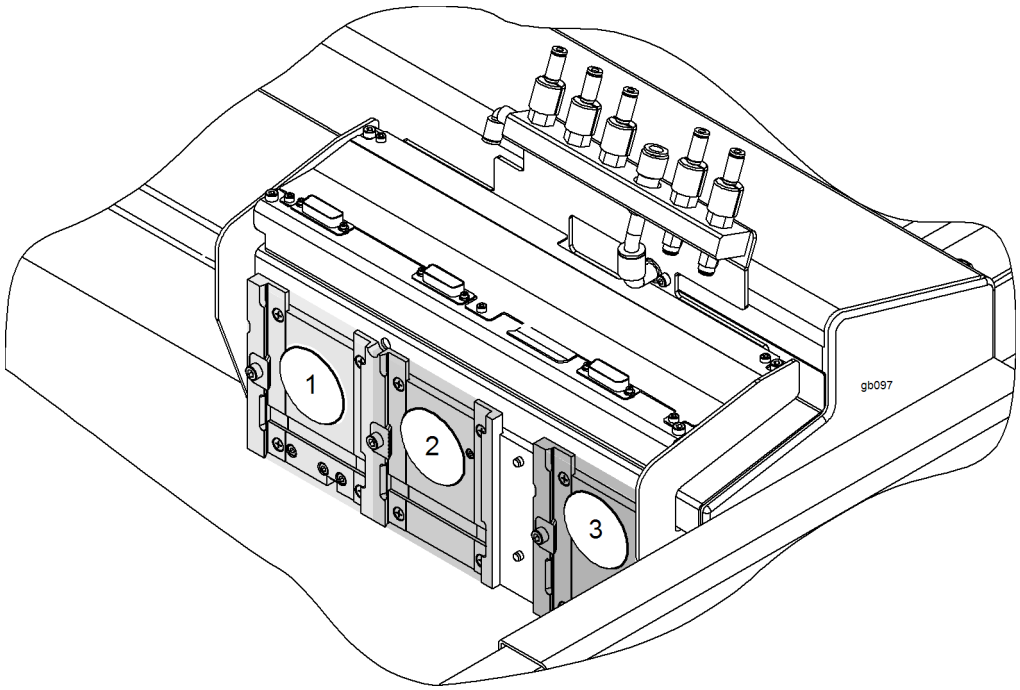

Fig. 5-13 Module 1 - 3

1-4-1 Tool pos. 1

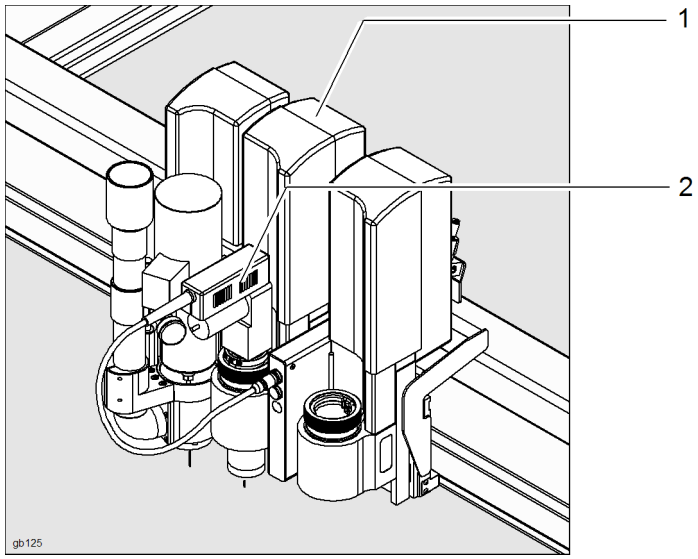

Fig. 5-14 Tool slot, tool assignment e.g. Module 2, tool 1

1 Module 2 (UM) = tool slot 2
2 Oscillating tool = tool 1

= **Tool pos. 1**

Each module consists of up to four tools (e.g. PUM). The first figure of the menu entry shows the tool slot of the module, the second figure shows the tool position.

The menu entries of the tools 11 - 14; 21 - 24; 31 - 34; (41 - 44)* are identical.

The allocations and settings of the tools are carried out in the following submenus.

1-4-2 Tool pos. 2

See tool pos 1

1-4-3 Tool pos. 3

See tool pos 1

1-5 Module carriage

Settings on the module carriage.

- Change module
- ICC Camera
- Laser pointer settings

1-5-1 Change module

Procedure for changing the module. See "Modules" section

1-5-2 Sensor/Camera

Settings for the laser pointer, ICC camera

1-5-2-1 Laser pointer settings

The laser pointer is an optical instrument for visually determining the reference point. The reference point (starting point) corresponds to the zero point in the coordinate system of the job file. See chapter "Controls and operation", "Laser pointer, reference point"

1-5-2-1-1 Pointer type

Both the current tool and the laser pointer can optionally be defined as the pointer for defining the reference point.

⇨ Select the pointer or tool and confirm with OK.

✓ The setting is saved

1-5-2-2 Camera light options

Switching camera lighting on/off

1-5-3 Manual move settings

Setting of the speed and acceleration for the procedure using the travel keys on the operating unit.

1-5-3-1 Up X&Y speed

Moving speed when the tool is raised.

Adjusting value: 1 - 1000 mm/s

1-5-3-2 Down X&Y speed

Moving speed when the tool is lowered.

Adjusting value: 1 - 1000 mm/s

1-5-3-3 Normal X&Y accel

Acceleration without activated SHIFT key

Setting in m/s^2

1-5-3-4 Fast X&Y accel

Acceleration with activated SHIFT key

Setting in m/s^2

1-5-4 Active tool

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Link to the active tool.

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1-6 Table

General table settings

1-6-1 Park options

The parking function is linked to the HP-GL command "PK" in the ONLINE operating status. If this command is triggered, the module carriage moves to the park position. The keys on the operating unit (other than keys 1 - 3) are blocked. Using *Exit park*1-6-1-1-3, the module carriage moves to the initialisation point and the ONLINE operating status is activated.

The park position settings of the module carriage and the options during the park function are carried out in this menu.

The park command positions the module carriage at a particular point on the work surface in order to be able to carry out settings work or loading and unloading without disruption.

If the park function is active, only functions from the submenu *Park options* 1-6-1-1 can be performed.

1-6-1-1 Park pump functions

Functions while the module carriage is in park position.

1-6-1-1-1 Vacuum off

Vacuum is switched on. Use 1 to switch the vacuum off

1-6-1-1-1 Vacuum on

Vacuum is switched off. Use 1 to switch the vacuum on

1-6-1-1-2 Blow

Suction function is active. Use 2abc to switch to blowing

1-6-1-1-2 Suction

Blowing function is active. Use 2abc to switch to suction

1-6-1-1-3 Exit park

Important !

The module carriage automatically moves to the zero position. The ONLINE operating status is activated.

Exit park

1-6-1-2 Move to park position

The module carriage moves to the defined park position.

1-6-1-3 Park position mode

Definition of which park position is to be moved to.

The following modes are available:

Axis	Description
X axis	The module carriage moves to *park position X*
Y axis	The module carriage moves to *park position Y*
X/Y axis	The module carriage moves to *park position X/Y*

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1-6-1-4 **X park pos**

Definition of the X coordinates of the park position

1-6-1-5 **Y park pos**

Definition of the Y coordinates of the park position

1-6-2 **Light barrier options**

Warning !

Risk of injury caused by non-activation of safety devices

The light barriers are part of the safety device!

- only deactivate the light barriers for installation purposes at Zünd
- before delivery, activate the light barriers and check that they function

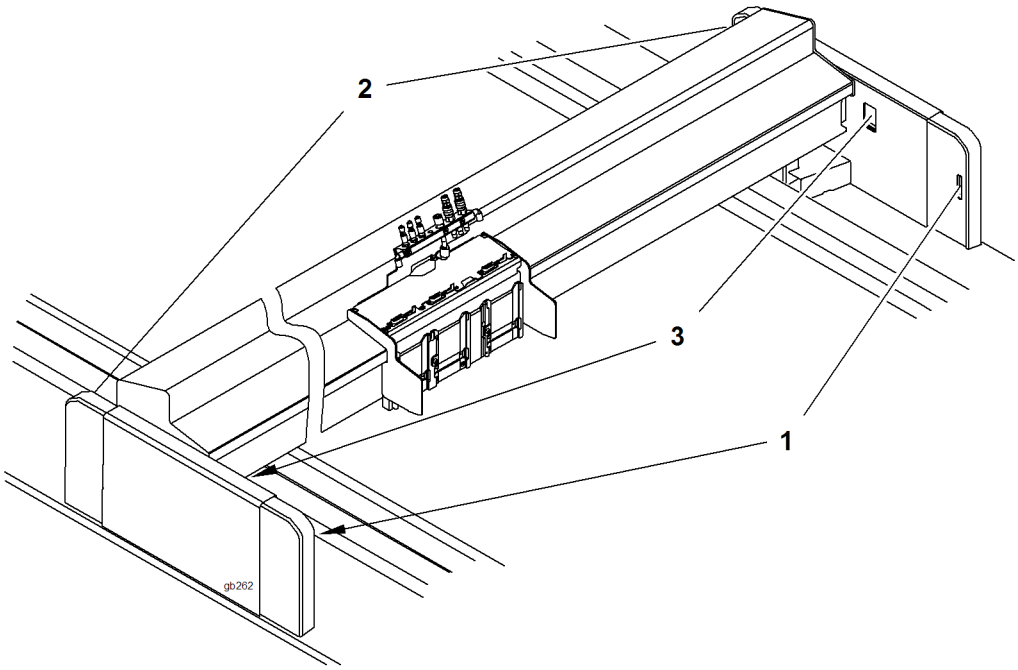

Fig. 5-15 Light barrier options

1	Front light barrier	**3**	Reflex light barrier
2	Back light barrier		

Menu for activating/deactivating the light barriers

1-6-2-5 **Test**

Warning !

Risk of injury due to safety devices not functioning/being switched off.

- Never put the machine into operation if the safety devices are not working.
- Check the function of the safety devices in accordance with the maintenance schedule.

Functions for testing the individual light barriers.

Procedure

⇨ Hold a piece of paper between the light barriers that are to be tested

⇨ The display must go from **Free** to **Interrupted**

If the light barrier is not working then contact your customer service centre.

1-6-2-5-1 Front light barrier

Testing the front light barrier.

Error	Light barrier defective
Free	The light barrier is not interrupted
Interrupted	The light barrier is interrupted

1-6-2-5-2 Back light barrier

Testing the front light barrier.

Error	Light barrier defective
Free	The light barrier is not interrupted
Interrupted	The light barrier is interrupted

1-6-2-5-3 Reflex LB left

Testing the front light barrier.

Error	Light barrier defective
Free	The light barrier is not interrupted
Interrupted	The light barrier is interrupted

1-6-2-5-4 Reflex LB right

Testing the front light barrier.

Error	Light barrier defective
Free	The light barrier is not interrupted
Interrupted	The light barrier is interrupted

1-7 Feeding options

Setting of the feeding system

1-7-1 Functions

Setting of the automatic/manually initiated feeding

1-7-1-1 Feeding options

Carry out automatic feed

1-7-2-1 Length

Length of the automatic feed

1-7-2-2 Speed settings

Speed of the automatic feed

1-7-2-3 Acceleration settings

Acceleration of the automatic feed

1-7-2-4 Feeding mode

The feeding mode function offers three different feeding and removal variations:

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- Normal: The material is fed in from the back and removed from the front.
- Bidirect 1: The material is fed and removed on the same side.
- Bidirect 2: The material is fed and removed on the same side. This process is carried out alternately once at the front and once at the back.

1-7-1-8 Feed comp.

Value for the compensation of the material-dependent track during a feed cycle in mm.

1-7-1-13 Ext. Stop

Feed stop, which is triggered by an external signal.

Active	The external signal is processed and the feed is stopped
Inactive	The external signal will not be processed any further

1-7-1-14 Mat. smooth

Description to follow

1-7-1-14-1 Material smooth

Description to follow

1-7-3 Driven unwind options

Settings of the unwind unit with core uptake

1-7-3-1 Unwinding unit core

Activate/deactivate unwinding unit with core uptake

1-7-3-2 Unwinding unit on

Switch on unwinding unit

1-7-3-2 Unwinding unit off

Switch off unwinding unit

1-7-4 Driven wind-up options

Settings of the wind-up unit with core uptake

1-7-4-1 Wind-up unit core

Activate/deactivate wind-up unit with core uptake

1-7-4-2 Wind-up unit on

Switch on wind-up unit

1-7-4-2 Wind-up unit off

Switch off wind-up unit

1-7-6 Aux drive 1

Functions for the setting of auxiliary drive 1

1-7-7 Aux drive 2

Description to follow

1-7-8 Aux drive 3

Description to follow

1-7-9 Unwind options

Set universal unwinding unit

1-7-9-1 Unwind options

Switch universal unwinding unit on/off

On	Universal unwinding unit is active
Off	Universal unwinding unit is not active

1-7-9-2 Status

Bit 0: cmd done
Bit 1: new cmd
Bit 2: vector done
Bit 3: new vector
Bit 4: error
Bit 5: no material
Bit 6: sheet feeder in position
Bit 7: -

1-7-9-3 Error

Bit 0: override
Bit 1: -5 V
Bit 2: +24 V
Bit 3: +VMot
Bit 4: min current
Bit 5: min distance
Bit 6: polarity
Bit 7: max current
Bit 8: AD timeout
Bit 9: source check
Bit 10: Vref check
Bit 11: H bridge check
Bit 12: axis check
Bit 13: H timeout
Bit 14: no material
Bit 15: l slight
Bit 16: zero mark
Bit 17: no store
Bit 18: no SPI slave
Bit 19: emergency
Bit 20: eeprom

1-7-9-4 Comm.error

Number of communication errors which occurred on the Universal Board.

1-7-11 Feeding clamps

Settings for the feeding clamps

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1-7-11-2 Release mode

Switching countermovement on/off

1-7-11-3 Countermovement

During the feed, the bar moves the set path backwards in order to ensure that the feeding clamps can be raised.

1-7-11-6 Lower feeding clamps

Feeding clamps are lowered to fix the material.

1-7-11-6 Lift feeding clamps

Raise feed elements

1-7-12 Feeding bar

Description to follow

1-7-12-1 Feeding bar

Description to follow

1-7-12-2 Fix feeding bar

Description to follow

1-7-12-2 Release feeding bar

Description to follow

1-7-15 External device 1

External auxiliary drive 1

1-7-16 External device 2

External auxiliary drive 2

1-7-17 Misc feeding options

Settings for the automatic material transport

1-7-18 Manual feed table

Functions for setting the manual feed table.

1-7-18-1 Manual feed table

Activate/deactivate the stop of the manual feed table.

1-7-18-2 Raise stop

Raise the stop

1-7-18-2 Lower stop

Lower the stop

1-7-18-3-1 Up delay

Delay time before the lifting of the stop.

1-7-18-3-2 Down delay

Delay time before the lowering of the stop.

1-7-19 Fusion Feeder

Description to follow

1-7-19-1 Fusion Feeder

Description to follow

1-7-19-2 Board feeder on

Description to follow

1-7-19-2 Board feeder off

Description to follow

1-8 Hold down functions

Setting the material hold-down. Depending on the application and the size of the table, either a turbine vacuum generator or a gas ring vacuum generator is used to generate the vacuum. See chapter "Controls and operation",

1-8-2 Vacuum pump options

Setting of the gas ring vacuum generator

1-8-2-1 Status

Activating/deactivating the vacuum generator

1-8-2-2 After on delay

Determines the interval between the switching on of the vacuum and the processing of the job in ms. This ensures that a vacuum is available once the job processing has been started.

1-8-2-3 After off delay

Determines the period after the processing of the job until the switching off of the vacuum.

1-8-2-4 Pump quantity

Pump configuration. Selection of the connected pumps.

1-8-3 Vacuum range

Setting of the vacuum width

See chapter "Controls and operation", "Material hold-down"

1-8-3-1 Vacuum range

For machines with continuously adjustable vacuum range.

1-8-3-2 Define vacuum range

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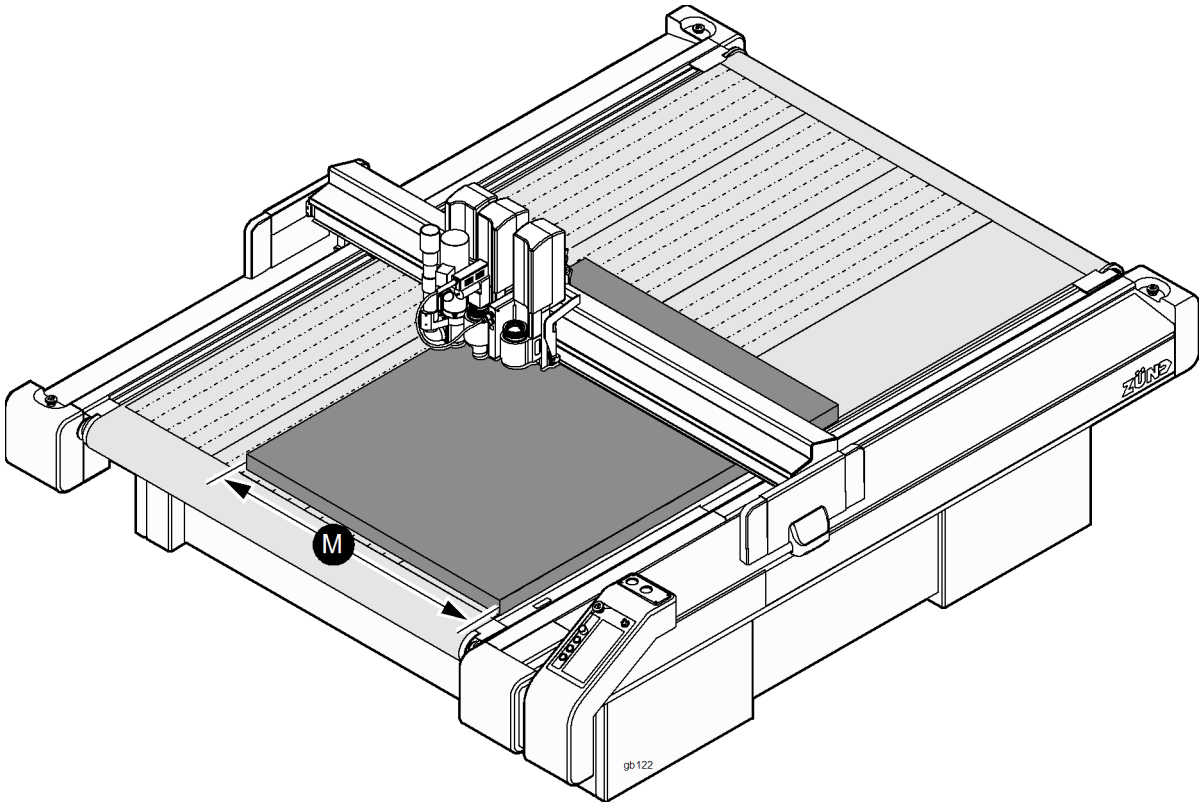

Fig. 5-16 Define vacuum range

⇨ position the active tool above the left edge of the material to be processed

⇨ Choose OK to confirm

✓ The vacuum range has been defined.

1-8-3-3 Active zones

The active tool moves to the end of the active vacuum range or to the last active vacuum zone.

1-8-3-5 Active zones

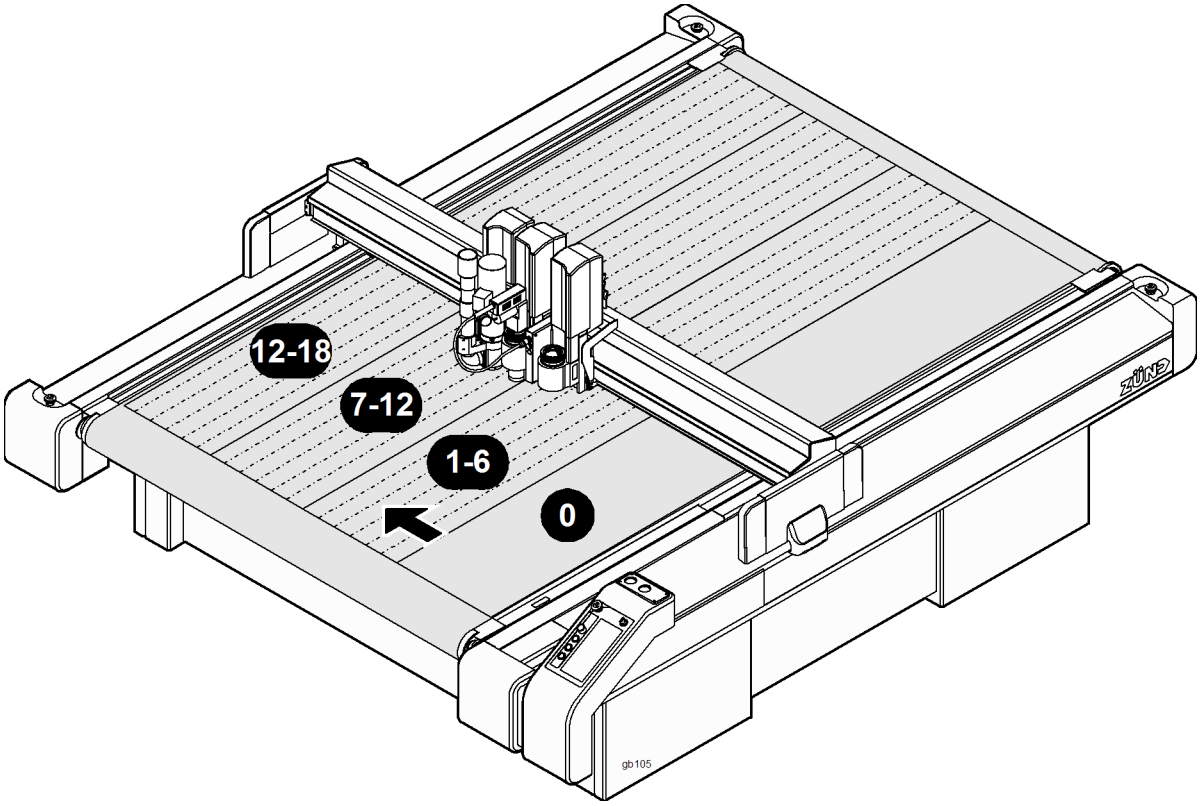

Fig. 5-17 Vacuum zones (e.g. L-2500)

Status display of how many vacuum zones are currently active.

1-8-4 **Switch valve options**

Settings for controlling the switch valve

1-8-4-1 **Switch valve options**

Activating/deactivating switch valve

1-8-4-4 **Pulse length**

Duration of the blowing

1-9 **Init tool options**

Setting and functions for automatic initialisation

1-9-1 **Init tool options**

Activate/deactivate init tool

1-9-2 **Start**

Ensure, that following precondition is fulfilled:

❑ the AKI is positioned on the work surface

The selected tool moves via the AKI and starts the initialisation procedure.

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2 Job setup

Settings relating to the current job

2-1 Reference point settings

Two reference points (start points) can be defined on the work surface. The reference point automatically determined by the machine during start-up is deactivated following the activation of a reference point. See chapter "Controls and operation", "Reference point"

2-1-1 Ref point 1 options

Set reference point 1

2-1-1-1 Move to reference

Position active tool at reference point 1

2-1-1-2 Clear reference

Clear reference

2-1-1-3 Define reference

Use the travel keys to move to the required position and confirm using OK.

2-1-1-4 Current X reference

Display of the X coordinates of the reference point

2-1-1-5 Current Y reference

Display of the Y coordinates of the reference point

2-2 Scale settings

Enlarge or reduce a job by the entered factor.

2-2-1 X scale

Factor X direction

2-2-2 Y scale

Zoom factor Y direction

2-3 Output

Menu item has no content.

2-3-1 Circle res

Menu item has no content.

2-3-2 String length

Menu item has no content.

2-4 Placement settings

Settings for positioning a job.

2-4-1 Rotation options

Menu item has no content.

2-4-1-1 Adjust angle

Menu item has no content.

2-4-1-3 **Define rotation centre**

Menu item has no content.

2-4-1-4 **Angle**

Menu item has no content.

2-4-1-5 **Centre X rotation**

Menu item has no content.

2-4-1-6 **Centre Y rotation**

Menu item has no content.

2-4-2 **Offset**

Move output in X/Y direction

2-4-2-1 **X Offset**

Value by which the output is moved in the X direction.

2-4-2-2 **Y Offset**

Value by which the output is moved in the Y direction.

2-5 **Buffer settings**

Buffer for the last job received in HPGL format.

2-5-1 **Clear buffer**

Clear buffer

2-5-2 **Start replot**

The last job is carried out again.

2-6 **Window settings**

Limit the working area of the machine (clipping). All data that are inside/outside of this window are ignored. Two windows can be defined independent of each other.

2-6-1 **Window 1 options**

Define window 1

2-6-1-1 **Window settings**

Switching window on/off.

If the window is deactivated, the maximum working area of the cutter is used.

If the window is activated, the defined limits cannot be exceeded in any operating status.

2-6-1-2 **Safety zone**

Selection of whether the blocked area is inside or outside of the defined window.

- Inside: the area outside of the window is blocked
- Outside: the area inside of the window is blocked

2-6-1-3 **Define corner**

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The window range is determined by entering two reference points on the working surface.

Procedure

⇨ Use the direction keys to position the active pointer in the lower right-hand corner of the required window area and confirm

⇨ Use the direction keys to position the active pointer in the upper left-hand corner of the required window area and confirm

2-6-1-4 Show window

Display of the window area. The limits of the activated window are shutdown.

2-6-1-5 Top left X

X coordinate of the upper left-hand corner of the window area.

2-6-1-6 Top left Y

Y coordinate of the upper left-hand corner of the window area.

2-6-1-7 Bottom right X

X coordinate of the lower right-hand corner of the window area.

2-6-1-8 Bottom right Y

Y coordinate of the lower right-hand corner of the window area.

2-6-2 Window 2 options

Define window 2

3 Functions

Functions for setting material hold-down, router, dust extractor, compressor

3-1-1 Vacuum

Setting the material hold-down by vacuum.

3-1-1-1 Vacuum status

Vacuum status: On / Off

3-1-1-5 Power level

Select power level between 1 and 10. The power level is monitored by a vacuum sensor and adapted to the requirements.

3-2-1-1 Rpm

Display of RPM

3-2-1-2 Increase RPM

Use the ▶ key to increase the RPM. Keep this key held down to increase the RPM more quickly.

3-2-1-3 Decrease RPM

Use the ▶ key to decrease the RPM. Keep this key held down to reduce the RPM more quickly.

3-2-1-4 Switch on router

Router is switched off. ▶ must be pressed to switch the router on

3-2-1-4 Switch off router

Router is switched on. ▶ must be pressed to switch the router off

3-2-1-6 EasyDrive on

Router converter EasyDrive is switched off. ▶ must be pressed to switch the router converter on

3-2-1-6 EasyDrive off

Router converter EasyDrive is switched on. ▶ must be pressed to switch the router converter off

3-2-3 Vacuum cleaner

For turning the dust extractor on/off

3-2-3-1 Switch off

Extractor is switched on. ▶ must be pressed to switch the extractor off

3-2-3-1 Switch on

Extractor is switched off. ▶ must be pressed to switch the extractor on

3-2-3-2 Dust extraction

Status display dust extraction on/off

3-3 Test functions

Tests to verify the functionality and quality of the cutter.

3-3-1 Polygon test cut

For testing modules.

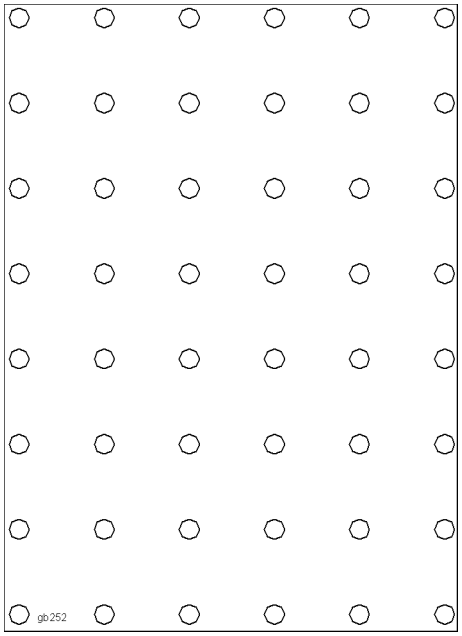

Fig. 5-18 Polygons (approx. 10 x 10 mm) distributed over the entire work surface

3-3-2 Square test cut

For testing modules.

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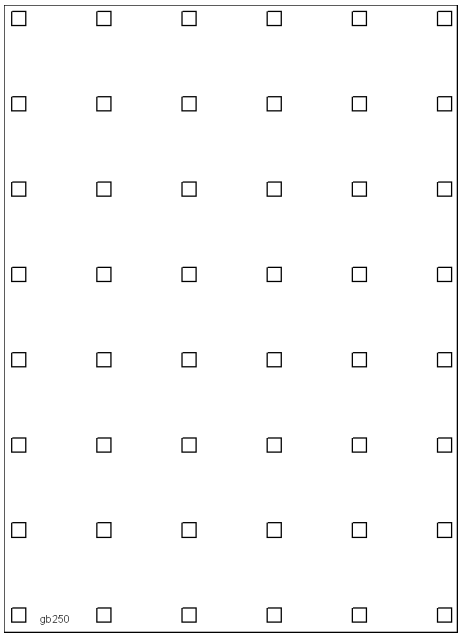

Fig. 5-19 Squares (approx. 10 x 10 mm) distributed over the entire work surface

3-3-3 Circle test cut

For testing modules.

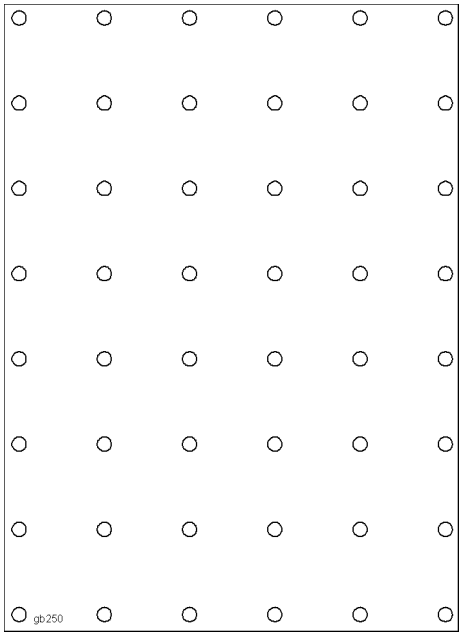

Fig. 5-20 Circles (diameter approx. 10 mm) distributed over the entire work surface

3-3-4 Diagonal test cut

For testing the drive elements (belts, bearings, motors) of the X and Y axis.

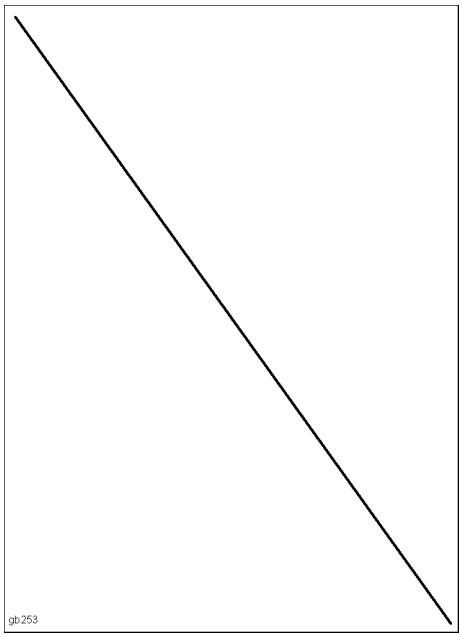

Fig. 5-21 Diagonal over the entire work surface

3-3-5 Random line

Continuous load test

Random lines distributed over the entire work surface

3-3-6 Random curve

Continuous load test

Random curves distributed over the entire work surface

3-3-7 DIN-Test

Quality test

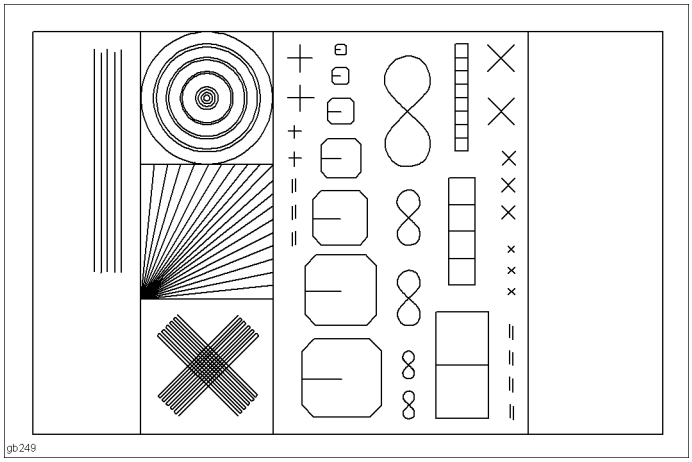

Fig. 5-22 DIN test, 255 mm x 170 mm

3-3-8 S-Test

Quality test

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Fig. 5-23 S test, 140 mm x 240 mm

3-3-9 **Move line**

as for diagonal test, except with limitation

Define line

⇨ Move to starting point, choose OK to confirm

⇨ Move to end point, choose OK to confirm

3-3-11 **Module 1**

Switch module 1 on/off

On: Module performs test

Off: Module does not perform test

3-3-12 **Module 2**

Switch module 2 on/off

On: Module performs test

Off: Module does not perform test

3-3-13 **Module 3**

Switch module 3 on/off

On: Module performs test

Off: Module does not perform test

3-3-14 **Module 4**

Switch module 4 on/off

On: Module performs test

Off: Module does not perform test

3-3-15 **Module 5**

Switch module 5 on/off

On: Module performs test

Off: Module does not perform test

3-3-16 **Module 6**

Switch module 6 on/off

On: Module performs test

Off: Module does not perform test

3-3-17 **Module 7**

Switch module 7 on/off

On: Module performs test

Off: Module does not perform test

3-3-18 **Module 8**

Switch module 8 on/off

On: Module performs test

Off: Module does not perform test

3-5 **Camera**

Setting of the camera lighting. The lighting is used to optimise the lighting conditions.

3-5-1 **Lighting off**

Switch camera lighting off

3-5-1 **Lighting on**

Switch camera lighting on

3-5-2 **Lighting mode**

Description to follow

3-5-3 **Lighting strength**

Setting of the camera lighting strength. The strength can be adjusted in seven levels.

3-5-4 **Shutter speed**

The shutter speed depends on the brightness and influences the sharpness/blurring of the image.

Settings:

- AUTO is usually used to automatically determine the optimum shutter speed.
- Short shutter speed (1/100 ks, 1/100000 s):
  - Lots of light is needed, otherwise the image will be dark
  - Sharp outlines emerge
- Long shutter time (1/6.25 s)
  - Less light is needed
  - Fuzziness/blurring emerges

3-5-5 **White balance**

The white balance corrects the colour distortions. The setting of the white balance takes place by selecting the appropriate light source.

Settings:

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- AUTO is usually used to automatically determine the optimum white balance. If an optimum result cannot be achieved with AUTO then you can identify the appropriate light source.
- Room lighting
- Fl. lighting (fluorescent tubes)
- Sun

3-5-6 BLC

The backlight correction (BLC) corrects colour distortions. In the case of reflective materials e.g. the ceiling lighting is reflected. This may distort the image.

The backlight correction (BLC) can be switched on or off.

4 User settings

Access to menus and functions is blocked according to the user level. The user levels have a hierarchical structure. This means that the next highest user also has the access rights to the menu functions that the subordinate user has.

User	Description
Users 1 - 3	All menus and functions that are needed for the operation of the machine are accessible
Operator	Certain settings work is permitted
Service	Cutter settings that can only be carried out by authorised service personnel
Factory setup	Basic settings already implemented at Zünd

4-1 User

⇨ Select user level and confirm with OK

⇨ Press R

⇨ Enter user code and confirm with OK

4-2 Password

⇨ Enter your user code

✓ The user level is approved and is displayed under *User*4-1

4-3 Start user

Setting of which user level is automatically active once the cutter has been started up.

5 **Communication setup**

Communications settings for parsers, interfaces,...

5-2 **Serial interface**

Communication settings for the serial interfaces

5-2-1 **COM 1**

Important !

If communications software (front end, terminal) is used, the communication settings for COM 1 must match those for the communications software.

Communications settings for COM 1

5-2-1-1 **Baud rate**

The baud rate defines the data transmission speed.

5-2-1-2 **Data bits**

Number of data bits during data transmission

5-2-1-3 **Stop bits**

Define the number of stop bits. Stop bits signal the end of a data word.

The choices are:

- 1
- 2

5-2-1-4 **Parity**

Define parity type. Parity is used to detect erroneous transfers.

The choices are:

- None
- Uneven
- Even

5-2-1-5 **Protocol**

Define protocol transfer.

The choices are:

- Hardware
- Software
- None

With "none", data may be lost!

5-2-2 **COM 2**

Communication settings for COM 2. The settings must match the software.

5-3 **Ethernet**

Important !

If communications software (front end, terminal) is used, the communication settings must match those for the Ethernet communications software.

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Communication settings for Ethernet connections

5-3-1 Tool connector

Entry of the communication port.
Default value =50000

5-3-2 IP address

Display of the IP address

5-3-3 IP template

Display of the IP template

5-3-4 Unused

No function

5-3 Logger

software for reading the log data

5-3-1 Log output

Switch log output of the communication settings on/off

6 Panel

Settings for the operating unit

6-1 Language

You can set your user language in this submenu.
Select the required language. Choose OK to confirm.

6-2 Volume

Setting of the signal volume

⇨ Enter value for the volume

⇨ Use *Save panel settings* 6-8 to save the settings

6-3 Panel contrast

Setting of the contrast of the display

⇨ Enter value for the contrast

⇨ Use *Save panel settings* 6-8 to save the settings

6-4 Length unit

Setting of the measurement unit: US units/Si units

⇨ Select the required unit. Choose OK to confirm.

⇨ Use *Save panel settings* 6-8 to save the settings

6-5 Function keys

Definition of the function keys (see chapter "Controls and operation", "Function keys")

6-6 Date format

Setting the date format

⇨ Select date format

⇨ Use *Save panel settings* 6-8 to save the settings

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6-7 **Date and time**

Setting the date and the time

6-8 **Save panel settings**

Saves all settings for the operating unit.

6-9 **Restore panel settings**

Resets all settings for the operating unit to a basic value.

6-10 **Panel version**

Displays the current version of the operating unit software

6-11 **Panel**

Displays the status of the operating unit

6-12 **Keyboard test**

This test enables any defective keys to be located.

The test can be carried out for all keys except the ESC key.

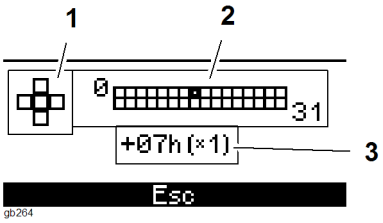

Fig. 5-24 Keyboard test

1 Control segments of the travel keys

2 Control segments of the operating keys

3 Keyboard code

⇨ Press key

✓ the corresponding control segment of the keyboard test is highlighted and the key code is displayed

Problem solution

When pressing a key, the key code is not displayed or the corresponding control segment is not highlighted

⇨ the key is defective - contact your service partner

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8 System info settings

Display of general information about the cutter

8-1 Table type

Display of the table type (e.g. L-2500)

8-2 Table number

Display of table number

8-3 Options

Installed options are displayed via a numerical code

8-4 Serial number

Display of the serial number

8-5 Software versions

Displays the current version of the software

8-5-1 MC

Description to follow

8-5-2 Panel

Description to follow

8-5-3 MC version

Display of the master controller version

8-5-4 MC Build

Internal number

8-5-6 Panel build

Internal number

8-5-7 YM board

Software version of the Y board

8-5-8 Camera board

Description to follow

8-5-9 Mod. board 1

Description to follow

8-5-10 Mod. board 2

Description to follow

8-5-11 Mod. board 3

Description to follow

8-5-12 Mod. board 4

Description to follow

8-6 Actual e-box temp

Display of the current E-box temperature

8-7 Max E-box temp

Maximum permitted E-box temperature

8-9 X mot. temp.

Display of the temperature of the X drive motor

8-10 Actual system outputs

Current system outputs

8-10-1 Output curve

Output curve

8-10-2 Output IPC buffer

Output IPC buffer

8-10-3 Output Log buffer

Output Log buffer

8-11 Stored system output

Stored system outputs

8-12 Operation hours

The operating hours counters are used to determine various maintenance activities. See chapter "Maintenance, cleaning", "Maintenance schedule"

8-12-1 Cutter

Display of the cutter's operating hours

8-12-2 Blower pump

Display of the operating hours of the blower pump

12 Shut down cutter

Switch off the machine

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6 Malfunctions

6.1 Troubleshooting

Attention !

Risk of injury due to incorrectly remedied faults

Ensure that the error on the device is remedied correctly. Contact you Zünd partner.

If cutter malfunctions occur and you need the help of our customer service department, make a note of the following details:

- Machine serial number
- The error message displayed on the operating unit
- A description of what circumstances the error occurred in

6.2 Locate error

Errors can be located both via the operating unit or (if the operating unit is defective) via the status and error display on the electronics unit.

Error display on the operating unit

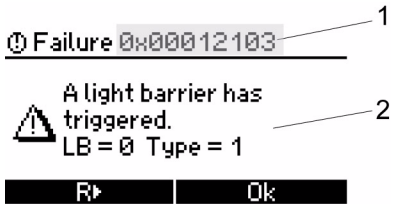

Fig. 6-1 Error display on the operating unit

1 Error code

2 Error description

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Error display on the status and error display (example)

The error is displayed as a sequence. No redundant figures of the error code will be shown in this display.

Example: The error **0x0001D503** is abbreviated to the figures **1D503**.

If several errors occurred one after the other then these are combined together in a group. The error which occurred first is displayed at the start of the group. All other errors follow in order.

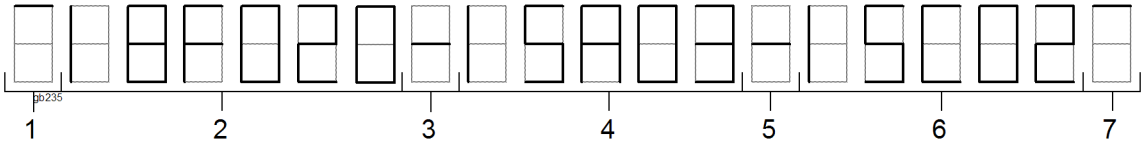

Fig. 6-2 Error display on the status and error display

Item	Sequence	Description
1	Introduction	The error group is started with the introduction sequence
2	Error code 1	Display of the error code recorded first
3	Separator	The display of the error is completed and another error follows
4	Error code 2	Display of the next error code
5	Separator	The display of the error is completed and another error follows
6	Error code 3	Display of the next error code
7	Conclusion	The display of the group has been completed

6.2.1 Error display

If a number of errors occurred then the first error of this sequences is always shown on the display of the operating unit (group).

All errors which have occurred after the confirmation of the last error are gathered together in a group.

Display last error group

Use SHIFT+ ESC (2nd soft key) to display all errors of the **last** group.

Display list of open errors

While the first error is shown on the display, SHIFT+ ESC (1st soft key) can be used to display a list with all **open** errors.

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6.2.2 Error code

The error code is made up of a 10-digit, uniquely allocated combination of numbers and letters.

The signal word before the error code indicates how serious the error is.

Signal	Error
Information	Important information for the operator
Caution	Notification of possible problems (overheating). Check status, remedy errors, contact the service department if necessary
Error	Errors that can probably be remedied - contact the service department if necessary
Alarm	Serious error - contact the service department

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6.3 Error messages

0x00000603 Int err.No msg could be sent.
Cmd: %0s
Index: %1s

Contact service

0x00001303 An unknown parameter ID (0x%0s) was requested from the internal database. The parameter is not currently loaded or does not exist.

Contact service

0x00004F04 Software exception %1s:
%2s

Contact service

0x00005403 Unknown command.
Cmd ID: %0s.

Contact service

0x00005503 Err during msg release.
Sys Cmd ID: %0s
MQX error ID: %1s

Contact service

0x00005803 Internal error:
An error occurred while waiting for a synchronous message.

0x00005A03 Internal error:
The pool for messages is full. No message could be saved in the pool.

0x00005B02 Internal error:
A message queue is full. The message has been deleted

0x00007702 Value outside of the validity range.
Min = %0s
Max = %1s

Cause

Parameter outside of the defined limits (HPGL).

Solution

Adjust parameter.

0x00007B04 HAL: Bit has already been assigned.
HAL file row number: %0s

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Contact service

0x00007C04 HAL: IO hardware element not loaded.
HAL file row number: %0s

Contact service

0x00007D02 HAL: No hardware has been assigned to the virtual object.

Contact service

0x00008003 Data initialisation error.

Contact service

0x00008602 HAL: Error when reading the HAL function.
HAL file row number: %0s

Contact service

0x00008702 HAL: Error when reading the HAL function parameter.
HAL file row number: %0s

Contact service

0x00008802 HAL: Error when reading the hardware ID.
HAL file row number: %0s

Contact service

0x00008902 HAL: Err. reading 8 bit value.
HAL file row number: %0s

Contact service

0x00008A02 HAL: Error when reading a frequency value.
HAL file row number: %0s

Contact service

0x00008B02 HAL: Error when reading a value.
HAL file row number: %0s

Contact service

0x00008C02 HAL: Error when reading a Boolean value.
HAL file row number: %0s

Contact service

0x00008D02 HAL: Unknown HAL element found.
HAL file row number: %0s

Contact service

0x00008E03 HAL: An HW element could not be connected with an MUX.
HAL file row number: %0s

Contact service

0x00009B03 The selected module is not supported.

Cause

At the moment the selected tool module is still not supported. For example, an attempt was made to change to module 4 even though module 4 is not available on this machine.

Solution

Select valid module.

0x0000A402 CRC error during transfer.

Cause

An error occurred during the examination of the checksum

Solution

Check communication

0x0000A603 HAL: An attempt was made to access an unknown HAL ID.
HAL file row number: %0s

Contact service

0x0000A703 HAL: Attempt made to access an undeclared BusElement ID.
HAL file row number: %0s

Contact service

0x0000A902 Incompl HP-GL comm
Command %2s is incorrect.

Cause

The HP-GL command was called up with too few parameters

Solution

Check HP-GL Manual for the call.

0x0000AA02 Unknown XX command.
Cmd: %2s

Contact service

0x0000AB02 HP-GL command not supported.

Cause

This HP-GL command has not yet been implemented

0x0000B902 Unexpected error:
The Altera has already been configured.

Contact service

0x0000BA04 Error when loading the Altera.

Contact service

0x0000BB04 N status error before loading the Altera.

Contact service

0x0000BC04 Altera not ready.

Contact service

0x0000BD02 HAL: Err. reading 16 bit value.
HAL file row number: %0s

Contact service

0x0000C002 The response to the command was not received in the expected time.

Contact service

0x0000C600 The cutter is not in a permitted operating status for this action.

Cause

The sequencer must be in waiting status for the function which has been called up.

Solution

Wait until vectors have been processed.

0x0000D204 AD converter error.
Index: %0s

Contact service

0x0000D603 Error in the controller.
Index: %0s

Contact service

0x0000DC02 Internal error:
The allocation for a watch job could not be found.

Contact service

0x0000DD04 Wrong voltage on amplifier.
Index: %0s

Contact service

0x0000DE03 Overload identified.

Check parameter speed/acceleration, adjust if necessary.

0x0000E204 Err. on axis voltages.
Axis code: %0s

Contact service

0x0000ED03 Head within the clipping area.

Cause

It was detected that the head is currently in a hard clipping area.

This was probably because a hard clipping window was defined at the point where the head is positioned or because a hard clipping area was activated.

Solution

The head must be brought out of this area or the hard clipping window must be defined differently. The head can only be moved out of this area manually.

If an automatic initialisation tool is available, then position this back in the park station so that the clipping window is free again.

0x0000EE02 HAL: Error during the reading of the comm devices in the bus definition.
HAL file row number: %0s

Contact service

0x0000EF02 HAL: Error during the reading of the device ID in the bus definition.
HAL file row number: %0s

Contact service

0x0000F203 Safety module gave notification of error
Has an emergency stop key been pressed?
Mode %0s

Cause

Error in basic function::change emergency stop()

0x01 -> No emergency stop active

0x02 -> 24V_NA still available

0x04 -> Emergency stop still active

0x08 -> Emergency stop not active

0x10 -> Safe_Con incorrect

0x20 -> A1_EMM incorrect

Solution

Check emergency module or basic function board

0x0000F304 Incorrect voltages on the BASIC FUNCTION BOARD.

Contact service

0x0000F403 HAL: Unknown internal IO port.
HAL file row number: %0s

Contact service

0x0000F502 HAL: No interrupt signal was assigned to an active port/bit.

Contact service

0x0000FA01 Editor open on other op. unit
Shut the editors on all other operating units and try again.

Cause

Parameters are currently being edited on another operating unit. While this is happening no data can be edited on a second operating unit

Solution

Wait until the editor is closed on the other operating unit. Attempt another time.

0x0000FB01 This user level requires a password.

Cause

If the user level has been changed and a password is needed for this purpose then the entry of the password is displayed with this message.

0x0000FC01 Access denied. Incorrect user code.

Cause

An incorrect user code was transmitted. Access has been denied.

0x0000FF04 The version of the saved database that has to be loaded is not compatible with the current software.

Contact service

0x00011501 System is already in the required operating status.

Cause

System is already in the initialisation status

0x00011602 It is not possible to change the operating status.

Cause

It is not possible to change directly from the current status to the required status. For example, it is not possible to change directly between the operating status ONLINE and the initialisation status.

Solution

First, set the correct status.

0x00011702 Stop factor overwritten

Contact service

0x00011B03 An instruction could not be restored. Inform the manufacturer of this error.

Contact service

0x00011C04 Err. during init of X & Y axes.
Curve axis: %0s
Init state: %1s

0x00011E03 Incorrect key allocation to the axes. Change configuration or use new software version.

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Contact service

0x00011F02 The command may not be carried out in this operating status. Change the operating status in order to carry out the command.

Cause

The instruction was discarded because it is not permitted in the current instruction mode.

Solution

Switch the system to the operating status OFFLINE or ONLINE and carry out the instruction again.

0x00012103 Light barrier triggered
LB = %0s Type = %1s

Cause

A light barrier has triggered, either because it is defective or because its beam of light was interrupted.

In the first parameter, the error states which light barrier it is related to and in the second it states what kind of error it is.

LB: 0 = Front light barrier

LB: 1 = Back light barrier

LB: 2 = Left-hand reflex light barrier

LB: 3 = Right-hand reflex light barrier

Type: 1 = Beam of light interrupted

Type: 2 = Light barrier probably defective

Important !

Be aware that it is not guaranteed that the connection of the front and back light barriers have been swapped.

Solution

- Remove object from the beam of light.
- Check that the light barrier is correctly connected
- Check for cable interrupt
- Replace light barrier.

0x00012902 This function or this parameter is not available for this module. Change the module.

Contact service

0x00012A03 This function is not permitted from this task.
Command: %0s
Caller index: %1s

Contact service

0x00012B03 This initialisation mode is not supported.

Contact service

0x00012C04 Axis inspection err.
Axis %0s
Error %1s

Contact service

0x00012F02 HAL: Not possible to configure the IO.
HAL file row number: %0s

Contact service

0x00013002 HAL: An output port has been defined for this HAL element.

Contact service

0x00013102 HAL: Not possible to set the IO direction.
HAL file row number: %0s

Contact service

0x00013202 HAL: An input port has been defined for this HAL element.

Contact service

0x00013303 Module selection error.

Contact service

0x00013704 No reference to the module carriage.

Contact service

0x00013803 Insufficient parameters

Contact service

0x00013B01 Module not available.

Cause

The currently installed tool head cannot be accessed on the required module.

Solution

Select the correct module or change the tool

0x00014103 Z axis init error.
Axis: %0s
Status: %1s

Contact service

0x00014203 T axis init error.
Status: %1s

Contact service

0x00014403 Incorrect module active.
Select the module %0s

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Contact service

0x00014501 Operating status in the process of changing.

Contact service

0x00014B03 Incorrect sequencer status

Contact service

0x00014C03 Peripheral could not be entered into the list.

Contact service

0x00014D02 Peripheral could not be found in the peripheral list.

Contact service

0x00014E02 Incorrect tool type.

Cause

This tool type is not supported.

Solution

Select available tool

0x00014F03 Tool connection not available.

Cause

An attempt was made to link a tool to a connection that is not available.

Solution

Select another port.

0x00015003 Tool timeout already active.

Contact service

0x00015102 No timeout job active.

Contact service

0x00015201 Database successfully saved.

Contact service

0x00015304 Whole DB deleted.
The cutter must be restarted.

Contact service

0x00015401 System is in the operating status STOPPED.

Cause

The system status may not be changed because the system is in the operating status STOPPED. It is only possible to leave the operating status STOPPED using operating unit 1.

Solution

Change operating status via operating unit 1.

0x00015502 Incorrect parameter for the arc command.

Cause

An attempt was made to draw a circle. The transferred parameters do not correspond with the definition. This error is transmitted if the data length of the message is incorrect.

Solution

Correct the parameters.

0x00015604 Module/tool voltage error.
Index: %0s

Contact service

0x00015702 HP-GL response function not found.

Contact service

0x00015802 Incorrect parameter.

Cause

Incorrect parameters were transferred when switching the tangential rotation on or off.

Solution

Correct the parameters.

0x00015901 The entire database was successfully reset to the default values.

Contact service

0x00015A01 Parameter successfully set to the default value.

Contact service

0x00015B01 Formula parameter successfully saved.

Contact service

0x00015C02 Unknown parameters for the output special command (OP).

Contact service

0x00015D02 An error occurred when setting the pen pulse duration.

Contact service

000012,03,02-2009, jmu

0x00015E01 Press the ONLINE key to repeat the output.

Cause

Message to the user after the replot command. The user will be prompted to press the Online key so that the replot can be carried out.

0x00016002 Curve vector length too short.

Contact service

0x00016202 Error when setting a sub-instruction.

Contact service

0x00016402 Incorrect serial interface parameter.

Contact service

0x00016502 Incorrect Z axis parameter.

Contact service

0x00016602 Table number not in the area.

Contact service

0x00016702 Table ID not in the area.

Contact service

0x00016901 No basic settings available.

Contact service

0x00016A01 Different versions of the settings.

Contact service

0x00016B03 No HAL file found.

Contact service

0x00016C01 The database was empty during start-up.

Contact service

0x00016D02 No response from the module carriage.

Contact service

0x00016E03 Communication lost.

Contact service

0x00016F01 HAL file successfully transferred.
Restart plotter.

Contact service

000012,03,02-2009, jmu

0x00017103 Temperature too high in the electronics unit.
The system may be damaged.
Temperature %0s °C.

Cause

The temperature in the BF board exceeded a critical threshold. This may cause damage to the hardware.

Solution

Switch machine off and leave to cool down. Contact service if this error occurs again.

0x00017301 Command currently not possible.

Cause

An instruction waits for commands, but is not able to process a prematurely received command.

Solution

Try another time. Contact the service department

0x00017402 Undefined status of an instruction.

Contact service

0x00017502 Error in the slide vacuum.

0x00017704 Communication error on an internal bus (CAN).

Contact service

0x00017803 Incorrect slide vacuum parameter. Error index %0s

0x00017A03 Vacuum slider current limitation.

0x00017B02 CAN message has been lost.

Contact service

0x00017C03 Incorrect module initialisation Status

Contact service

0x00017D04 Operating unit has lost the communication to the MC.
CAN Tx error.

Contact service

0x00017E04 Operating unit has lost the communication to the MC.
CAN Rx error.

Contact service

0x00017F03 Error when looking for the zero mark of the T axis.

Contact service

000012,03,02-2009, jmu

0x00018003 Distance outside of range.

Contact service

0x00018202 Initialisation module stopped.

Cause

The initialisation of a module was interrupted. The head modules are set to an uninitialised status and can no longer be moved.

Solution

The initial status can be reproduced by carrying out a reinitialisation of the head.

When confirming the error, the head is reinitialised to module 1.

0x00018302 Error when exporting the user log file.

Contact service

0x00018402 Value is not a valid number.

Contact service

0x00018504 Timeout during start-up. No communication to the system.

Contact service

0x00018602 Error when setting the axis position.

Contact service

0x00018701 Please wait.

Cause

The user must wait until the function has terminated.

0x00018803 Error with the database trigger.

Contact service

0x00018A03 Internal error:
No owner task.

Contact service

0x00018B03 Error during access to the edge sensor.

Contact service

0x00018C02 Reference point outside of the limits.

Cause

The reference point was set outside of the travel range.

Solution

Authorise or move reference point

0x00018D03 Tool overcurrent.

Cause

An overcurrent error occurred in the tool.

Solution

Pull the tool out of the material.

0x00018E03 Excess module temperature.

Cause

The module is too hot.

Solution

Wait until the module has cooled down.

0x00019003 Communication between the panel and MC interrupted.

Contact service

0x00019103 Unknown module position.

Contact service

0x00019302 This tool is still inserted in another module.

Contact service

0x00019402 Incorrect logger parameter.
Index = %0s!

Contact service

0x00019503 Clipping area is too small.

Cause

The clipping window was defined to be too small. It is not possible to carry out a calculation.

0x00019702 Errors are still present.

Contact service

0x00019801 Command %0s not carried out.

Contact service

0x00019904 Error during the system start-up. Restart the cutter.
Error no.: %0s
Error index: %1s

Contact service

0x00019A01 No travel movement is possible with the current module.

000012,03,02-2009, jmu

Cause

A virtual module is selected. It is not possible to move the axes with this module. The virtual module is selected if a select pen is set on a module which is not available on the active head.

Solution

Select valid module.

0x00019C03 Terminator characters not permitted.

Contact service

0x00019D02 Unknown machine ID.

Contact service

0x00019E03 Flash already occupied.

Contact service

0x00019F02 Error in a S19 row.

Contact service

0x0001A202 Feeding clamp not configured.

Cause

The feeding clamp is not installed/has not been activated.

Solution

Activate the feeding clamp in the feeding clamps menu.

0x0001A303 Feed initialisation error.

Cause

An error occurred during the initialisation of the page feed process.

Solution

Check paging configuration.

0x0001A403 No material.

Contact service

0x0001A603 Incorrect number of parameters in the feed command.

Cause

Incorrect number of parameters for a paging function.

Solution

Correct command

0x0001A703 HAL: Unknown Altera function.
HAL file line no.: %0s

Contact service

0x0001A803 HAL: Unknown Altera string.
HAL file row number: %0s

Contact service

0x0001A903 HAL: It is not possible to configure a stop trigger at this Altera input.
HAL file row number: %0s

Contact service

0x0001AA03 HAL: Bit does not exist.
HAL file row number: %0s

Contact service

0x0001AB03 HAL: Insufficient bits available for the assigned function.
HAL file row number: %0s

Contact service

0x0001AC03 An error occurred when parsing the HAL file.

Contact service

0x0001AD03 Error in the status machine.

Contact service

0x0001AE02 Deletion failed. Tool is still assigned to a module.

Cause

An attempt was made to delete a tool, but the tool is still connected to a module and therefore cannot be deleted.

Solution

The tool must first be removed from all modules.

0x0001AF01 A tool of this type and with this number already exists.

Cause

An attempt was made to attach a tool but the attempted combination of tool type and tool number already exists.

0x0001B003 Collet is open. The router cannot be started.

Contact service

0x0001B102 Router still running, collet cannot be opened.

Contact service

0x0001B203 The router converter is currently already being used by another tool.

000012,03,02-2009, jmu

Cause

An attempt was made to use a router converter on two different tools at the same time.

0x0001B303 Timeout when starting the router.

Cause

The router could not reach its speed after being switched on.

0x0001B403 Router overloaded. Could not keep up the specified speed.

Cause

The router has deviated too much from the target speed and has therefore been stopped.

Solution

It may be the case that the routing speed has not been adjusted to the material.

0x0001B503 Router overloaded.
The current in the converter is too high.

Cause

The router is overloaded. There is too much current flowing.

Solution

It may be the case that the routing speed has not been adjusted to the material.

0x0001B603 Different table reference point.

Cause

A module was removed or added. In this process it was determined that the same zero point can no longer be used.

0x0001B702 Dummy module active.

Contact service

0x0001B801 Light barriers not active.

Contact service

0x0001B903 Setup object not available.

Contact service

0x0001BA03 No tool object available.

Contact service

0x0001BB04 Virtual HAL object is already being used by another application.
eHALIdent: %0s

Contact service

000012,03,02-2009, jmu

0x0001BD03 Hardware not available.

Contact service

0x0001BE03 Error in the user data command.
Cmd:%1s
Tsk:%2s

Contact service

0x0001BF02 AKI not available.

Cause

AKI not available

Solution

Connect AKI and activate. Warning: The plug for the option board can be inserted incorrectly in spite of the coding. Check the plug. Is the correct HAL file loaded?

0x0001C003 AKI sensor error.

Contact service

0x0001C102 Cutter database is corrupt. The data has been lost. The standard values were used.

Contact service

0x0001C203 Automatic initialisation is not possible with this tool.

Cause

The automatic initialisation tool cannot be used on this tool.

Solution

This setting can be adjusted by the user. However, the default setting is supplied by the tool.

0x0001C303 Maximum position reached.

Cause

The travel range for the initialisation of the tool has been reached.

- No tool in the module
- Sensor defective.

0x0001C403 AKI unexpected status.

Contact service

0x0001C502 The %2s command is only permitted in the service user level.

Contact service

0x0001C602 This type of AKI position indicator is not supported.

Contact service

0x0001C704 Parameter transfer complete. Restart the cutter in order to use the new parameters.

0x0001C803 AKI in the park station.

Cause

The AKI must not be in the park station during use. An attempt was made to carry out tool initialisation even though the AKI is still in the park station.

Solution

Position AKI on the table

0x0001C903 AKI not in the park station.

Cause

The action to be carried out (e.g. start-up) demands that the AKI is in the park station

Solution

Position AKI in the park station. Restart cutter.

0x0001CA04 Errors occurred during the parameter transmission. Nothing has been saved. Restart the cutter in order to restore the old status.

Contact service

0x0001CB02 Automatic initialisation tool blocked for tool.

Cause

The initialisation of the tool is blocked via the automatic initialisation tool.

Solution

Change the corresponding tool parameter AKI_possible.

0x0001CD03 Unexpected programming error.

Contact service

0x0001CE03 Invalid controller parameter.

Contact service

0x0001CF03 Error in the message parameter.
Cmd: %0s
Task: %1s

Contact service

0x0001D003 Incorrect axis sequence.

Contact service

0x0001D204 The power unit is too hot. The electronics may be damaged.

Cause

The power unit is too hot, the cutter must be switched off and the problem in the power unit must be remedied.

Solution

It may be the case that the ventilation in the power unit is not correct. Check for dirt and clean if necessary.

0x0001D303 Unauth. mod. change
This can lead to hazardous situations.
Always use "Start module change" to assemble or dismantle modules.

Cause

A module was assembled or dismantled without the system being notified. This can lead to a hazardous situation.

0x0001D402 ACBug Controller data lost.

Contact service

0x0001D503 Too many parameters selected for the ACBug output.

Contact service

0x0001D604 Flash access error.
Error number: %0s

Contact service

0x0001D701 Change to module %0s. Module carriage moves.

Cause

Information for the users that there is an automatic change to another module and that the module carriage is moving.

0x0001D803 Mod. supply (VMOT) could not be switched on.
The time was exceeded.

Contact service

0x0001D903 Mod. amplification (AMP) could not be switched on.
Timeout.

Contact service

0x0001DA03 The module backup could not be opened.

Contact service

0x0001DB03 Option board not found.

Contact service

0x0001DC01 This slot cannot be used. (Already occupied or not available.)

Contact service

0x0001DE03 The Z link synchronisation has not come about.

Contact service

0x0001DF04 The sequencer task has not started.
The Altera is therefore not ready.

Contact service

0x0001E002 Unstable controller parameters.
Axis: %0s
Error:%1s
i params
0x0001 neg high param
0x0002 pos low param
0x0004 high smaller than low
v Params0x0100
0x0200
0x0400

Contact service

0x0001E101 Vacuum generator error

Contact service

0x0001E201 Vacuum generator not ready.

Contact service

0x0001E303 Timeout during switching of the tool connection.

Contact service

0x0001E401 Pump switch-on error.

Contact service

0x0001E801 Pump switch-off error.

Contact service

0x0001E904 A status bit in the Z link has been occupied twice.

Contact service

0x0001EA01 No pump or valve available to switch on.

Contact service

0x0001EB01 HW must first be allocated to an option board.

Contact service

0x0001EC02 Tool not inserted in conn. %0s.

Contact service

0x0001ED03 Excess temperature of the X axis motor.

Cause

An excessive temperature was measured on the X motor.

Solution

- Wait until the temperature has cooled down.
- Check the sensor.

0x0001EE03 Excess temperature X axis motor.

Cause

X motor displays an excess temperature.

Solution

Wait until the temperature reduces.

0x0001EF03 No sealing air available.

Cause

Sealing air is not (no longer) available.

Solution

Check sealing air.

0x0001F201 Machine not implemented.

Contact service

0x0001F301 Settings are saved.

Contact service

0x0001F401 The blower has already been in use for more than 6000 h. Please contact the service department.

Cause

The vacuum generator has already been in use for more than 6000 h.

Solution

Contact your service partner

0x0001F501 The blower has already been in use for more than 8000 h. Only half the power can still be used.

Cause

The vacuum generator has already been in use for more than 8000 h. Only a maximum of half the power is still available

Solution

Contact your service partner

0x0001F603 Callback functions could not be registered.

Contact service

0x0001F703 The speed requirement could not be reached.

Cause

The speed requirement of the router was not reached.

0x0001F803 Altera ZERO pointer.

Contact service

0x0001FA03 Error when writing data via Z link.
Index: %0s

Contact service

0x0001FB03 Error when reading data via Z link.
Index: %0s

Contact service

0x0001FC01 OptionBoard (Str1A) not available. The manual feed table was therefore deactivated.

Contact service

0x0001FD04 Timeout in the sequencer.
Error: %0s
Last cmd: %1s

Contact service

0x0001FE02 Err. in mod. data. Error in the parity test.

Contact service

0x00020002 A mod. offset is outside the tolerance.
Module: %0s
Offset: %1s

Contact service

0x00020102 Err. during data inspection.
The data cannot be used.

Contact service

0x00020204 Err. during Altera programming.

Contact service

0x00020304 Short circuit detected.
Index: %0s

Contact service

0x00020403 Cam. focus aid not locked.

0x00020503 PWM control over-modulated.
The parameters must be adjusted.

Contact service

0x00020603 Aux drive %0s not ready.

Contact service

0x00020704 Comm to Y board interrupted.

Contact service

0x00020803 Overload detected on OptionBoard.
String no. = %0s.
Driver no. = %1s.

Contact service

0x00020903 Incompl HP-GL comm
Data may have been lost.
Command %2s is incorrect.

0x00021104 Fork light barrier err.
Axis: %0s
Status: %1s

Contact service

0x00021203 Incorrect axis index.

Contact service

0x00021403 Rev transport with aux drive blocked.

0x00021503 Trans file not a plotter update.

Contact service

0x00021603 Trans file not a panel update.

Contact service

0x00021703 Trans file not YM board update.

Contact service

0x00021803 Trans file not a cam. update.

Contact service

0x00021903 Trans file not a mod. board update.

Contact service

000012,03,02-2009, jmu

0x00021A03 New mod. board FW does not match installed mod. type. installed: %2s

Contact service

0x00021B03 Trans Altera file not recognised.

Contact service

0x00021C03 No data for update.

Contact service

0x00021E01 OptionBoard (Str1A) not available. Take-up/unwind units therefore deactivated.

Contact service

0x00022401 Error during camera communication.

0x00022503 In the case of PUM, a cylinder locks in the lower position.

0x00022601 Changes to the ethernet parameters will only become effective after the plotter is re-started.

0x00022703 The received HPGL command does not correspond to the syntax: %2s

0x00022803 Universal board: Typing error.

0x00022903 Universal board: Read error.

0x00022A03 In the case of PUM, no cylinder has arrived in the lower position.

0x00022B03 Synchronisation problem on the UniBrd-SPI.

0x00022C03 An error occurred on the universal board.

0x00022D01 The start point is outside of the value range and will therefore be deactivated.

0x00022E03 Negative feeds cannot occur with the universal unwind unit.

0x00022F02 Please insert the PUM into another slot.

0x00023003 The received front end command does not correspond to the syntax: Error after command: %2s

0x00023203 This front end command is not permitted in this status: %2s

0x00023301 OptionBoard (Str1A) not available. The external feed stop has therefore been deactivated.

0x00023403 The external feed stop is active.

0x00023703 The router drive is off.
Use the stand by button to start it.

000012,03,02-2009, jmu

000012,03,02-2009, jmu

7 Cleaning and maintenance

7.1 General

– This chapter describes (in tabular form) all the maintenance jobs which are required for the machine.
– The maintenance list only affects the basic unit. Maintenance activities for modules, tool inserts and options can be found in the respective operating manual.
– Maintenance jobs that operators can carry out themselves are specially indicated and are described in more detail in this chapter.

Important !

In general, no special tools are required for maintenance jobs that operators can carry out themselves.

- All other jobs must be undertaken only by personnel authorised by Zünd or by Zünd Systemtechnik Customer Services or by contractual partners authorised by Zünd Systemtechnik.

Important !

Do not exceed the specified maintenance and cleaning intervals. You can shorten these intervals if necessary at your own discretion.

Carry out the maintenance jobs conscientiously at the specified intervals. The intervals are given in calendar periods or operating hours.

Maintenance recommendation

The manufacturer recommends that a general inspection of the machine is carried **once per year**. This interval can be reduced in the case of greater utilisation and load to the system.

Regular maintenance extends the lifetime of the cutter. Provide the service technician with the accessories case and ensure that the maintenance work is confirmed.

Shutting down/extended downtimes

If the machine is to be shut down for a prolonged period or decommissioned, please contact your customer service representative to arrange proper conservation of the machine or to put the machine back into operation.

Work instructions

- When working on the machine you must observe the safety measures described in the "Safety" chapter.
- Absolute cleanliness must be maintained at all times.
- Replace damaged parts immediately with new original spare parts.

Modules and options

Maintenance intervals/instructions on maintenance and cleaning for modules and options can be found in the corresponding operating manual.

000001,07,12-2008, jmu

7.2 Safe maintenance of the machine

General safety instructions

- Servicing and repair work must be carried out by trained specialist personnel.
- For periodic checks/inspections you must comply with the mandatory intervals or the intervals specified in the instruction manual. Equipment appropriate to the task must be available in order to carry out maintenance tasks.
- The maintenance schedule specifies precisely who is to carry out which jobs. The jobs listed as daily/weekly tasks may be carried out by operating personnel after appropriate training.
- You must ensure that spare parts meet the technical requirements laid down by the manufacturer. Original spare parts are always guaranteed to do so.
- The wearing of protective clothing (see "Personal protective equipment, clothing" in "Safety") is obligatory during maintenance and cleaning work.
- Keep unauthorised personnel well away from the machine during maintenance work.
- If possible, clearly attach a "DO NOT SWITCH ON" sign to the machine's main control panel during maintenance and cleaning work.
- Express approval must be obtained before carrying out welding or grinding work on the machine.
- Safety data sheets of the resources used can be found on the Zünd homepage.
- General safety instructions on handling chemicals can be found in the section "Safety", "Handling and storage of chemicals"

7.3 Operating resources

7.3.1 Handling operating materials

Following the instructions for handling operating materials carefully will increase the reliability and service life of the machine.

Follow the regulations for handling chemicals, particularly cleaning fluid and lubricants.

Environmental protection

- Always take care to protect the environment
- Observe the disposal regulations applicable in your country.
- Dispose of spent operating materials correctly

Disposal !

This concerns spent materials such as lubricants, adhesives, water/oil mixtures (maintenance unit) and all devices that were in contact with these materials.

- Observe the rules on environmental protection when disposing of spent materials.
- Collect and store all spent materials separately in suitable containers and dispose of them in an environment-friendly manner and only at official sites.
- Observe the regulations applicable in your country.

000001,07,12-2008, jmu

7.3.2 Cleaning fluids

Attention !

The use of incorrect cleaning fluids not approved by Zünd will damage the machine.

Only use cleaning fluids recommended by Zünd Systemtechnik.

Do not use abrasive cleaning fluids. Caustic substances and scouring agents can damage surfaces of the cutter (e.g. operating unit).

Cleaning fluids	Place of use
Plastic cleaning fluid	Covers, metal parts

7.3.3 Lubricants

X/Y axis guide rails, bearings

This machine uses a specially adapted synthetic lubricant which is also used in the food and pharmaceutical industry. This is characterised by good water resistance and corrosion protection and can be used at a temperature range from -25 °C to +120 °C.

Description	Specification
Klüberoil®	4UH1

Gears

To lubricate the gears, a Teflon special grease is used for precision gears in order to reduce friction.

Description	Specification
Fin Grease MP 2/3	-

7.3.4 Adhesives

Conveyor belt

Description	Specification
Körapur	784/5

Screw locking

Only use adhesives for screw locking if this is specifically stipulated in the service manual.

Description	Specification
Loctite	243

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7.4 Steps for maintenance

Different types of symbols (circle, box, star – solid; circle, box, star – outline) divide the service and maintenance tasks into two groups.

Meaning of symbols:

Outline symbols: ○, □, ☆

- This service and maintenance work is carried out by **authorised service personnel of Zünd Systemtechnik**.

Solid symbols: ●, ■, ✶

- Service and maintenance work is the **individual responsibility** of the company operating the machine or its operating personnel.

Important !

If necessary, carry out work before the stated intervals

Change worn parts before the specified intervals as well.

000001,07,12-2008, jmu

Maintenance/inspection during operating hours					Work to be carried out	
Daily	Weekly	Monthly	Annually (2000 h)	Special intervals	**By personnel** ● **One-off activity** ■ **Repetitive interval** ✶ **If necessary** **By authorised maintenance personnel** ○ **One-off activity** □ **Repetitive interval** ☆ **If necessary**	Chapter
					General	
■					Visually check the machine for damage	
■					Free the machine of dust and processing residue	
■					Check electrical equipment (options) to ensure they function	
■			□		Check correct functioning of the emergency stop switch	
■			□		Check all safety devices (correct functioning of light barriers, protective trip switch)	
					Table complete	
			□		Check all screw connections and tighten according to requirements if necessary	
			□		Check levelling	
			□		Check feed system*	
			□		Check cabling/wiring and cable routing for signs of wear	
					Vacuum plate	
			□	Conveyor replacement	Check levelling and adjust if required	
			□		Check the correct functioning of the vacuum zone control	
					Bar	
			□		Check perpendicularity and align if required	
			□		Check length compensation and adjust if required	
					Feeding options	
	■		□		Clean rubber cushions/needle cushions* of the feed elements	7.7.10
	■		□		Clean feed guide rail	7.7.10
			□		Clean and oil feeding clamp piston rods	
					X axis drive	
		■	□	☆	Clean and oil guide rails/guide carriage	7.7.5, 7.7.6
			□		Check tension of toothed/steel belt and readjust if necessary	
			□		Check alignment of toothed/steel belt and readjust if necessary	
			□		Check pivot bearing tension, adjust if necessary	
			□		Clean and lubricate the gears	
			□		Clean the drive belts	
			□		Clean the drive and guide rollers	
■			□		Clean the chipping protection brush	7.7.9
					Y axis drive	
		■	□		Clean and oil the guide rails	7.7.7

000001,07,12-2008, jmu

Maintenance/inspection during operating hours					Work to be carried out	
Daily	Weekly	Monthly	Annually (2000 h)	Special intervals	**By personnel** ● **One-off activity** ■ **Repetitive interval** ✶ **If necessary** **By authorised maintenance personnel** ○ **One-off activity** ☐ **Repetitive interval** ☆ **If necessary**	Chapter
			☐		Check alignment of toothed/steel belt and readjust if necessary	
			☐		Check tension of toothed/steel belt and readjust if necessary	
			☐		Check the belt tension	
				☆	Replace V-belt	
			☐		Clean and lubricate the gears	
Module carriage						
			☐	☆	Check clearance, replace bearing if necessary	
		■	☐		Lubricate bearing	7.7.8
			☐		Replace wiper	
Vacuum generator 1-9 KW/1-15 KW						
			☐		Check correct functioning	
			☐		Clean filter	
			☐	Conveyor replacement	Check piping for damage and tightness	
			☐	6000 B	General inspection	
Compressor *						
	■				Check the oil level, if necessary top up oil according to specifications	Refer to the manufacturer's operating manual
		■			Check water separator and drain water if necessary	
		■			Drain condensate from air cylinder	
		■			Check pressurised pipes for leaks – eliminate any faults	
		■			Check air intake filter, replace if clogged	
		■			Clean compressor	
		■			Check piping for damage and tightness	
			☐		Check the function of the safety valve, adjust if necessary	
			☐		Replace compressor oil	
Maintenance unit						
		■	☐		Drain condensation water	7.7.11

000001,07,12-2008, jmu

7.5 Lubrication diagram

Lubricate all lubricating points indicated in the lubrication diagram in accordance with the specified maintenance intervals.

The machine is lubricated using **Klüberoil 4UH1®**.

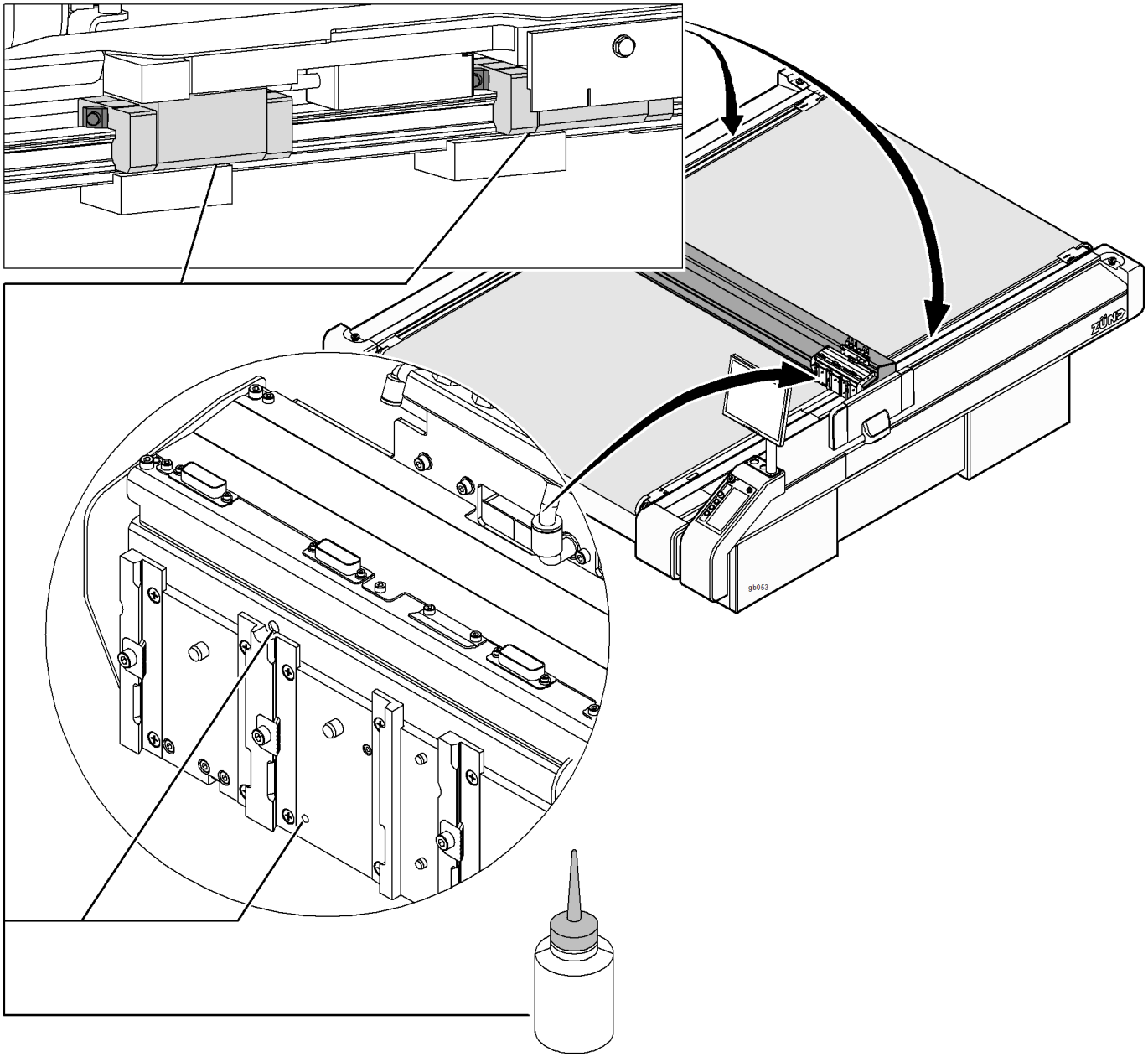

Fig. 7-1 Lubricating points

Place of lubrication	Amount	Cause
Module carriage	2 x	Guide rails and guide bearings
Right-hand bar guide	2 x	
Left-hand bar guide	2 x	

7.6 Accessories case

The accessories case contains useful tools and equipment for the operation or maintenance of your machine.

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Contents

Accessories	Amount	Activity
Allen screwdriver 4 x 170 mm	Qty. 1	Assemble/disassemble modules
Vacuum element spacers	Qty. 6	Service/Installation
Adhesive tape; width 19 mm	Qty. 1	Service/Installation
Teflon grease	20 ml	Service
Soldering fluid brush	Qty. 1	Service
Plier stapler[1]	Qty. 1	Change conveyor belt
Applicator gun KPM 250 ECON[1]	Qty. 1	Change conveyor belt
Adhesive tape, double-sided[2]	Qty. 1	Fix cutting base
Special guideway oil	2 x 25 ml	Lubricate X/Y axis guide rails, guide bearings
Greasing set for X axis guide rails	Qty. 1	Lubricate X axis guide rails, bearings

1) Accessories for machines with conveyor

2) Accessories for machines with cutting bases

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7.7 Maintenance jobs

7.7.1 Service flaps and covers

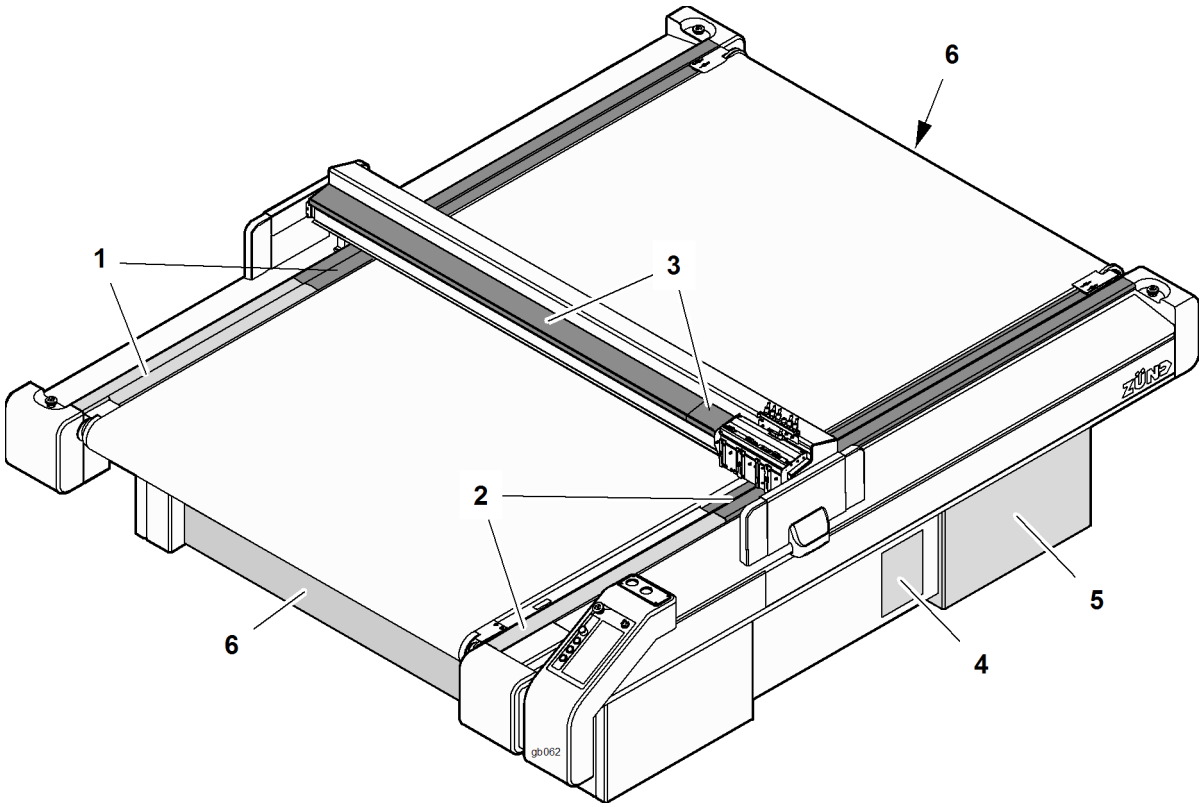

Fig. 7-2 Service flaps, covers

Item	Description	Task
1	Cover	Oil and clean the left-hand guide rails
2	Cover	Oil and clean the right-hand guide rails
3	Cover	Oil and clean the module carriage guide rails
4	Maintenance unit access	Drain the condensation water, set the pressure
5	Power unit cover	Fuses
6	Cover	Change conveyor belt, vacuum generator access

Important !

For reasons of safety, all other covers should only be opened for service work by Zünd staff of people authorised by Zünd.

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7.7.2 Maintenance position

Warning !

Danger of injury

The cutter may be put into operation by third parties.

- Always place the cutter in the maintenance position before carrying out maintenance work!

Unless expressly required otherwise, move the machine to the maintenance position before starting maintenance work.

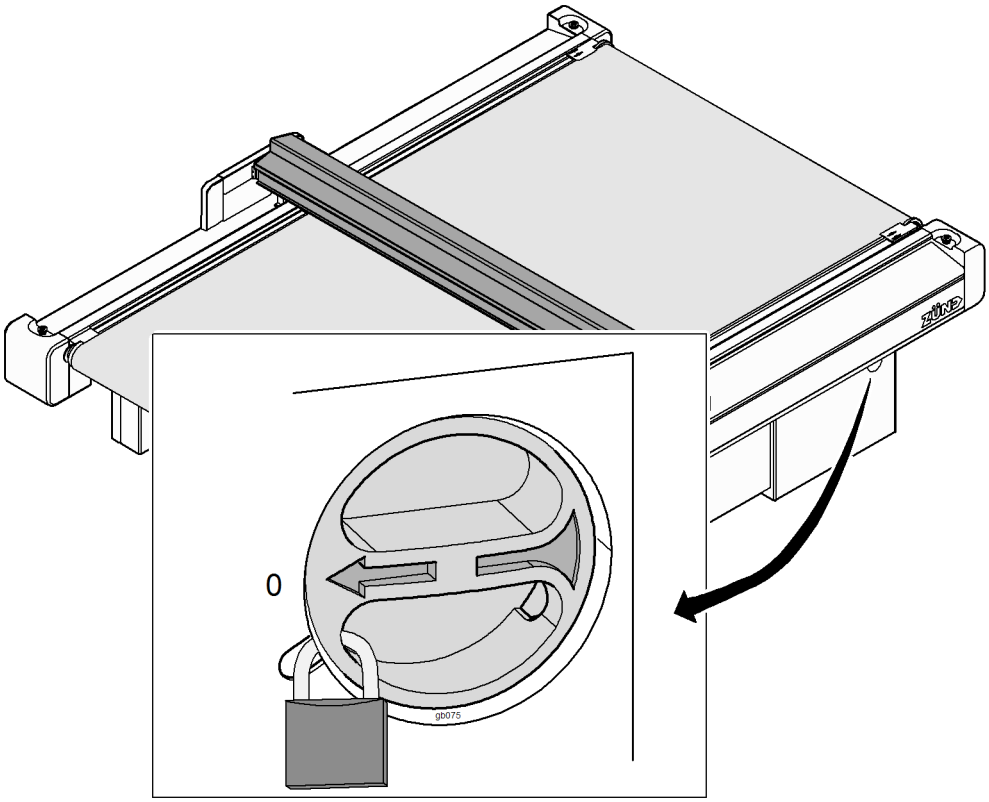

Fig. 7-3 Secure the machine

– Switch off the machine using the main switch.

– Protect the machine against unauthorised start-up (block the on/off switch with a lock)

7.7.3 Visually inspect the machine for damage

Attention !

There is a risk of injury if the machine is damaged

Before daily commissioning ensure that there is no damage to the machine.

- Never start up a damaged machine.
- Have damage repaired immediately by authorised service personnel

Daily checks

- Walk around the cutter and check the machine for damage.
- Make sure that all the covers have been fitted. Fit any covers that are missing.

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7.7.4 Clean the machine

Zünd cutters are production machines that are subject to enormous amounts of stress on a daily basis. Keeping the machine clean will help to keep operation as free from interruption as possible.

Important !

Do not use compressed air to clean the machine.

Loose cuttings and other dirt will end up in the bearings and drive belts and damage them.

Attention !

Danger of damage

Incorrect cleaning products and methods will damage the machine

- Only use gentle cleaning agents and plastic maintenance products for cleaning.
- Never clean the tool using ultrasound, a steam jet, compressed air etc.

Procedure

- Clean the table, operating unit, all covers and panels with a plastic maintenance product at regular intervals (weekly).
- Regularly (daily) remove all materials residues from the table, the tools and modules.
- Keep the environment clean (free from material residues, dust).

7.7.5 Clean X axis guide rails

Tools and materials

- Lubricant for guide rails, bearings
- Clean, lint-free rags
- 4 mm Allen key

Ensure, that following precondition is fulfilled:

❑ The machine is in the maintenance position.

Remove the covers

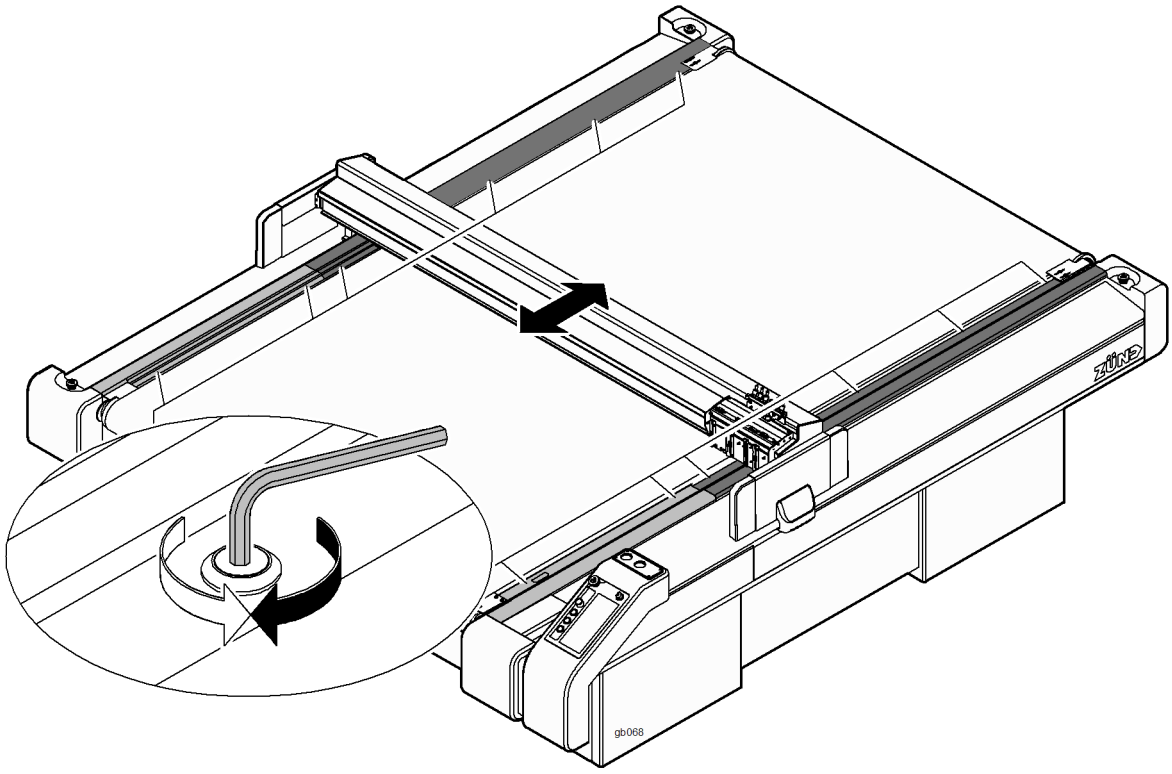

Fig. 7-4 Remove the covers

⇨ Push bar away from the cover that is to be removed

⇨ Remove the screws

⇨ Remove the covers

Cleaning the guide rails

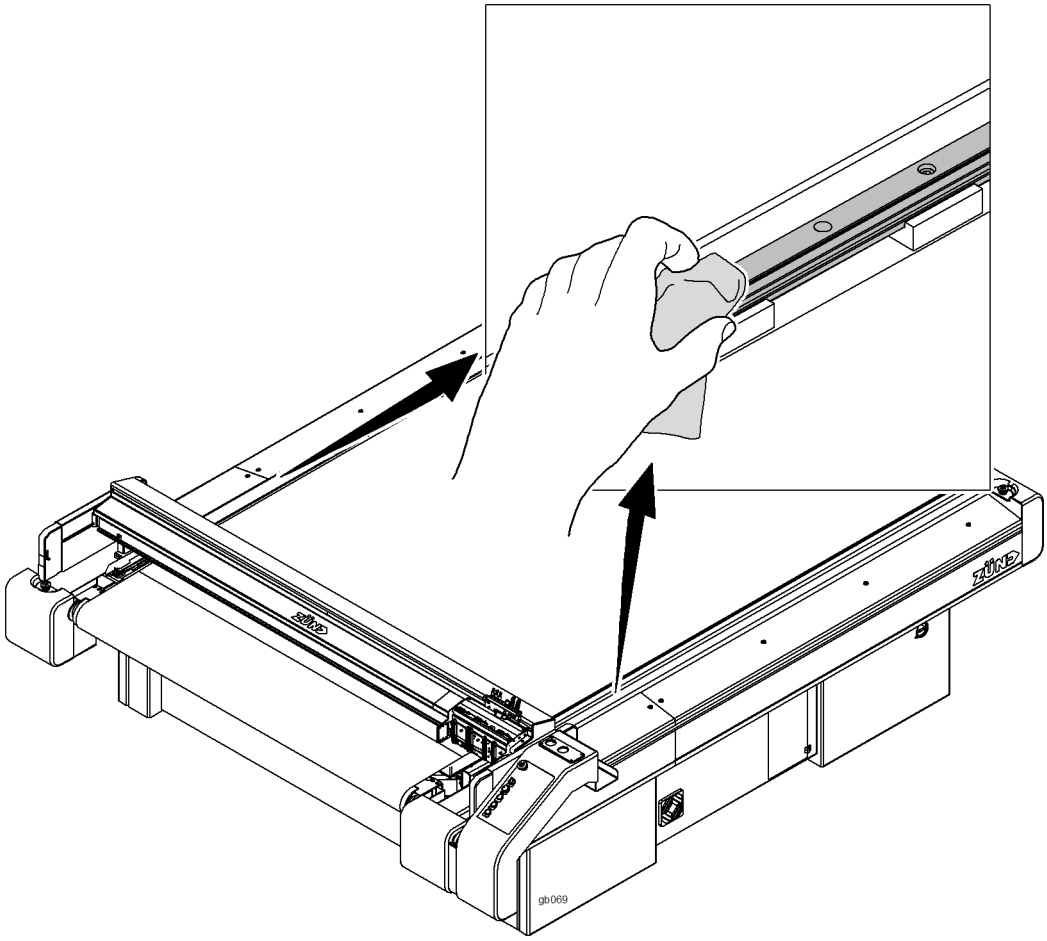

Fig. 7-5 Oiling the guide rails

⇨ Push the bar forwards

⇨ Thoroughly clean the entire length of the guide rails using a lint-free rag

⇨ Soak a lint-free rag with lubricant for guide rails / bearings and oil the guide rails

⇨ Fit the covers

7.7.6 Oil X axis guide bearings

Tools and materials

- Lubricant for guide rails, bearings
- Greasing set for X axis guide rails, bearings
- 4 mm Allen key
- Clean, lint-free rags

Ensure, that following precondition is fulfilled:

❑ The machine is in the maintenance position.

Remove the covers

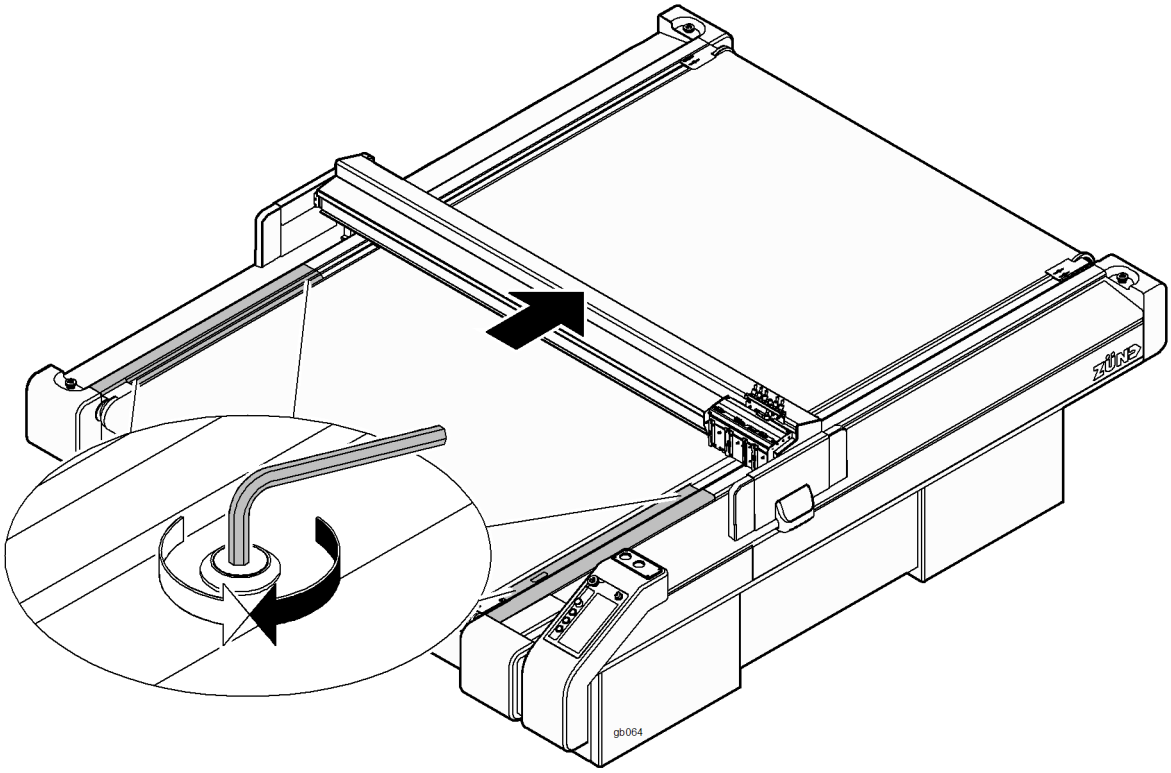

Fig. 7-6 Remove the covers

⇨ Push the bar backwards

⇨ Remove screws

⇨ Remove the covers

Guide bearings

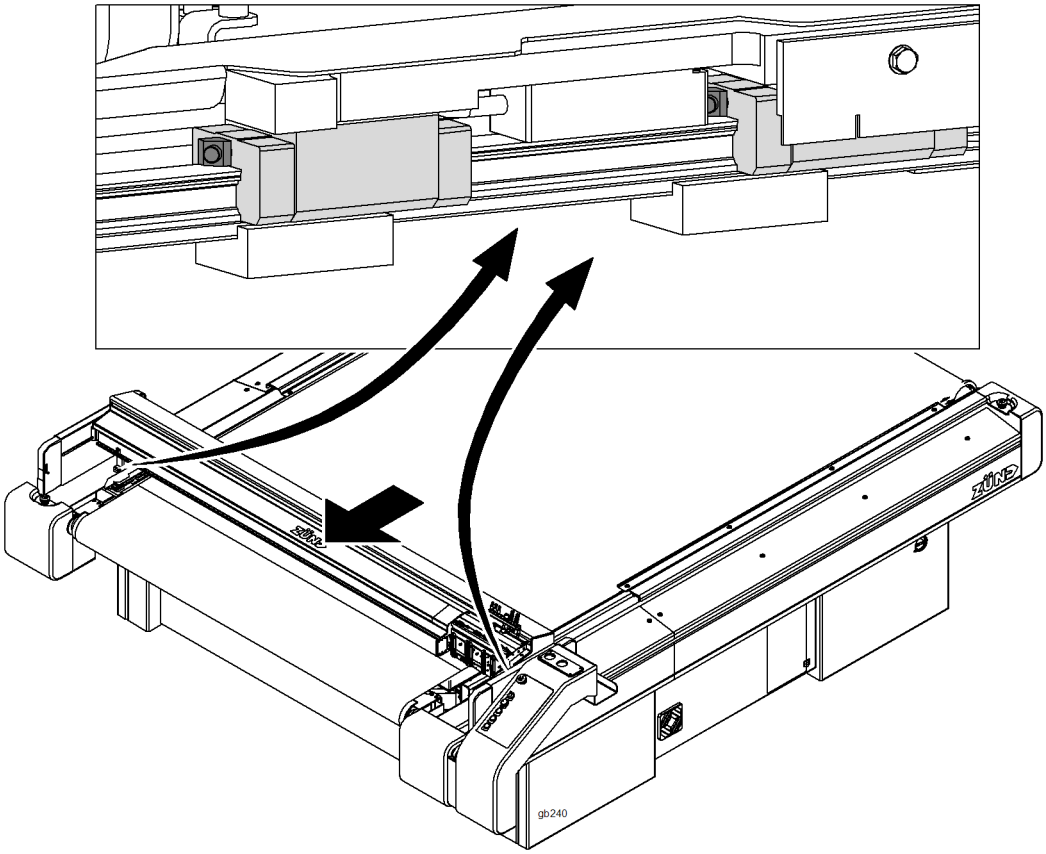

Fig. 7-7 Guide bearings

The bar is mounted with 2 guide bearings on a guide rail on each side. Oil these bearings at intervals according to the maintenance schedule.

Lubricating the lubrication points

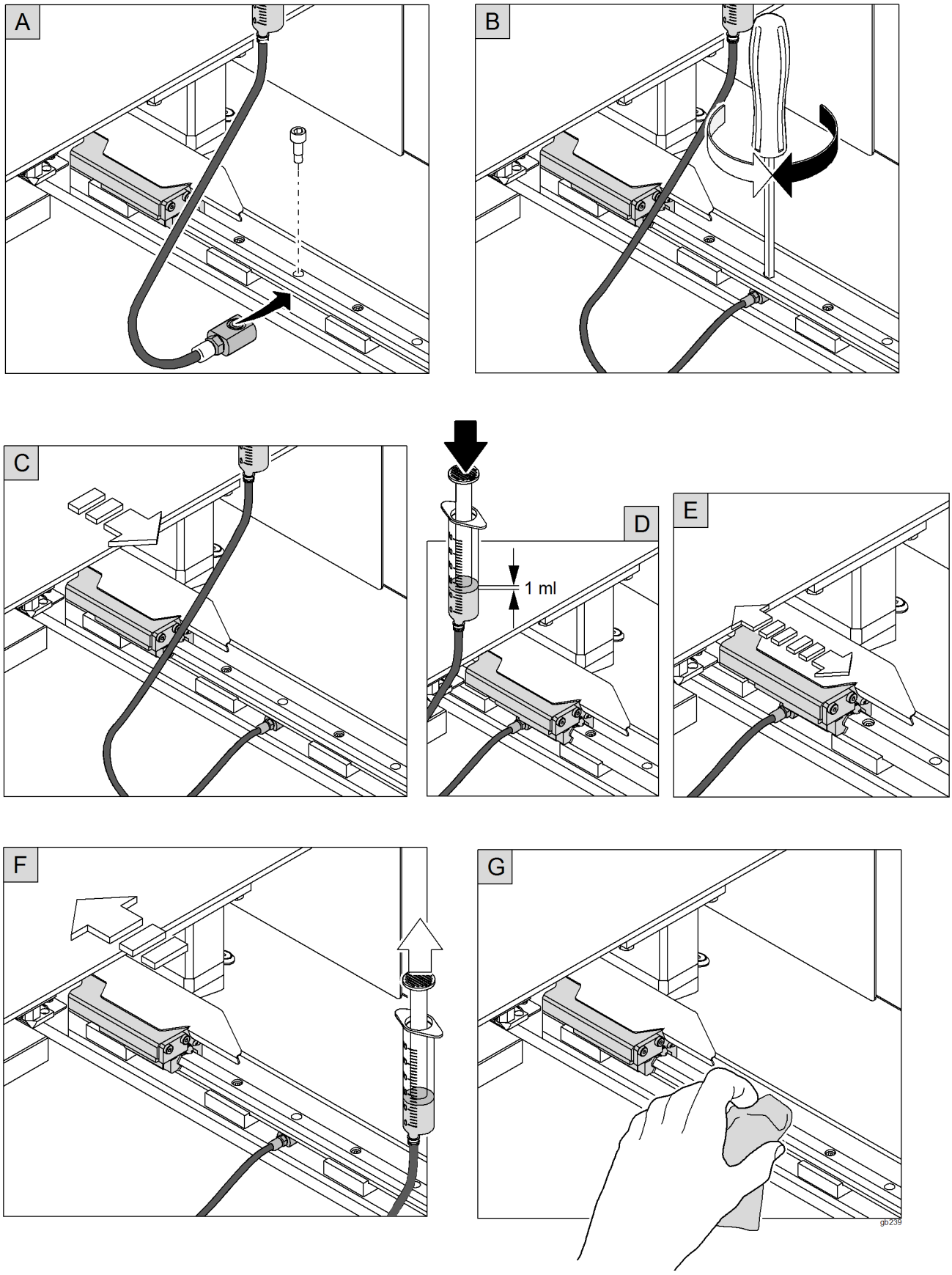

Fig. 7-8 Lubricating the lubrication points

⇨ Push the bar forwards

- ⇨ Screw the lubrication connection of the lubrication set onto the guide rails behind the bar (A, B)
- ⇨ Press the syringe until the feed line is ventilated
- ⇨ Position the guide bearings above the lubrication connection (C)
- ⇨ Use the syringe to insert approx. 1 ml of oil into the guide bearing (D)
- ⇨ Move the bar forwards and backwards 10 times over the length of the guide carriage via the lubrication connection (E)
- ⇨ Use the syringe to extract remaining oil. Then move the bar forwards (F)
- ⇨ Clean the guide rails using a lint-free rag (G)
- ⇨ Remove the greasing set
- ⇨ Lubricate the guide bearing on the other side in the same way
- ⇨ Fit the covers

7.7.7 Cleaning/oiling Y axis guide rails

Tools and materials

- Lubricant for guide rails, bearings
- 4 mm Allen key
- Clean, lint-free rags

Ensure, that following preconditions are fulfilled:

- ❑ The machine is in the maintenance position.
- ❑ All modules have been dismantled from the module carriage.

Remove the covers

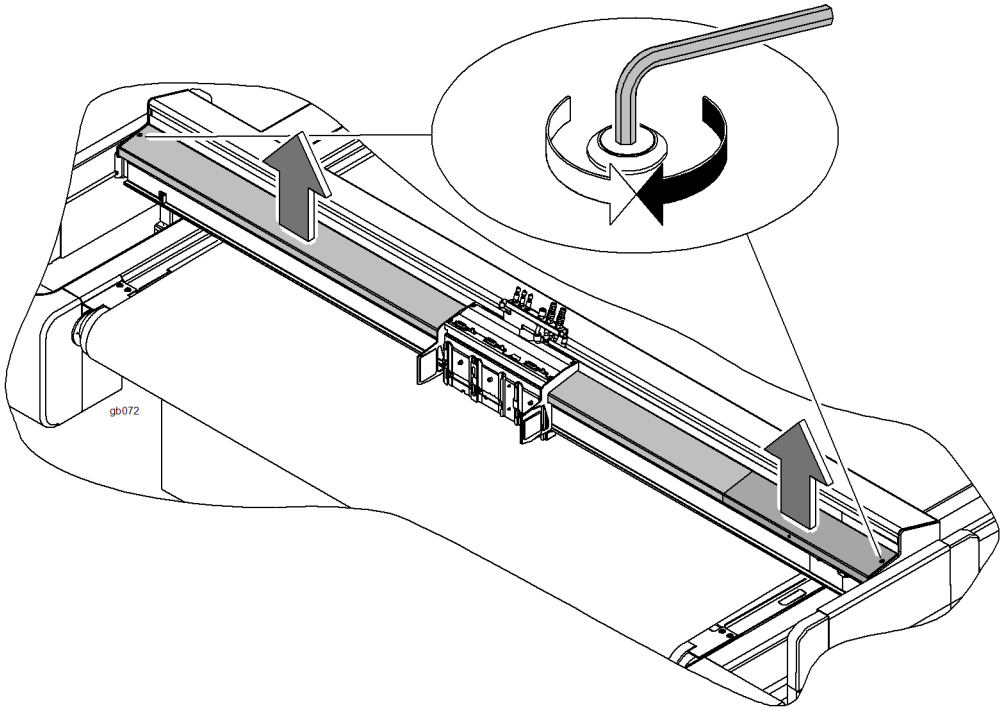

Fig. 7-9 Remove the covers

- ⇨ Push the bar forwards
- ⇨ Remove the safety screws from the ends

Important !

The covers are fastened onto the bar with Velcro.

- ⇨ Push the module carriage away from the cover
- ⇨ Remove the cover

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Cleaning the guide rails

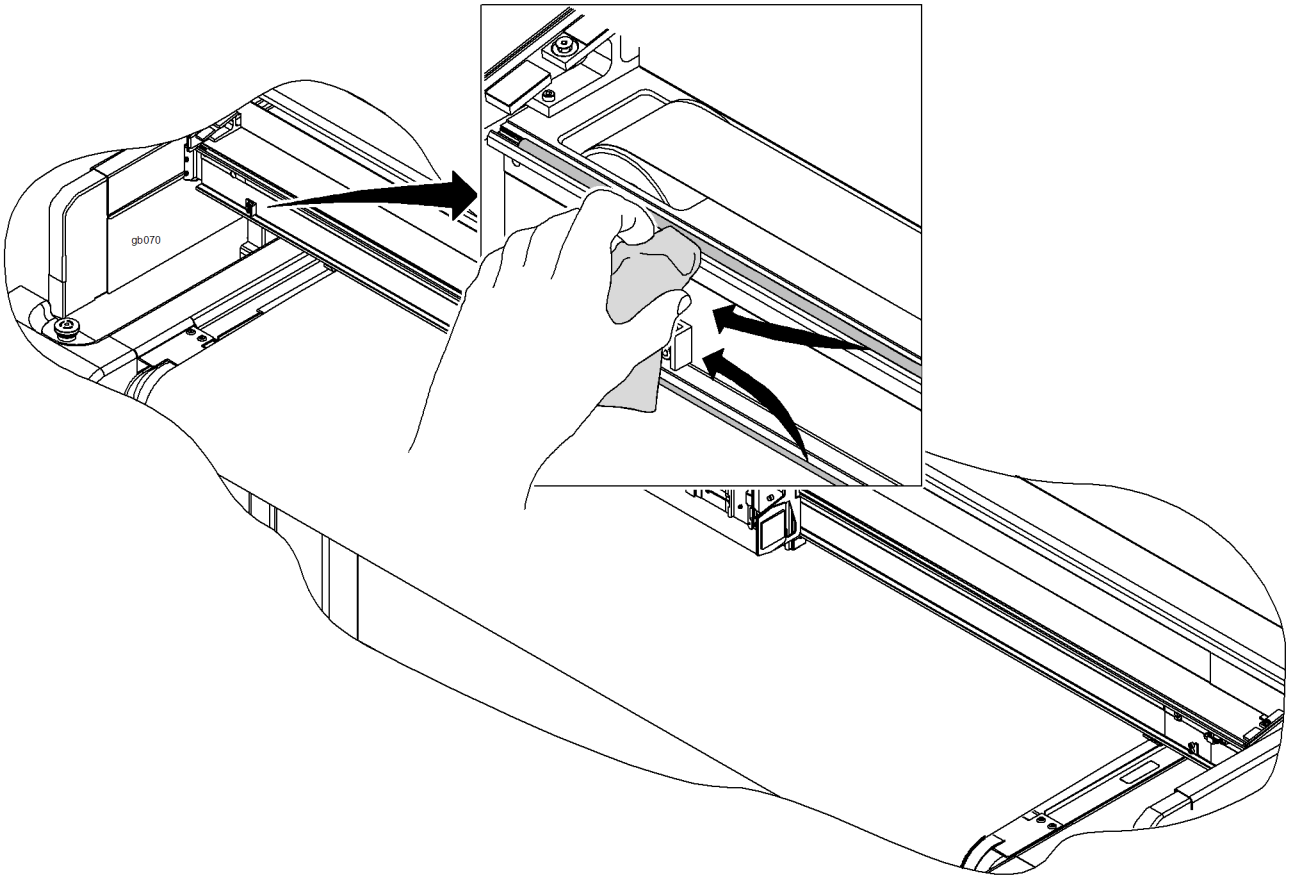

Fig. 7-10 Cleaning the guide rails

⇨ Clean the entire length of the guide rails using a lint-free rag

⇨ Soak a lint-free rag with lubricant for guide rails / bearings and oil the guide rails

⇨ Fit all the covers

7.7.8 Lubricating the Y axis bearing

Tools and materials

- Lubricant for guideways
- 4 mm Allen key
- Clean, lint-free rags
- Cardboard base or drip tray

Ensure, that following preconditions are fulfilled:

- ❑ The machine is in the maintenance position.
- ❑ All modules have been dismantled from the module carriage.

Lubricate bearing

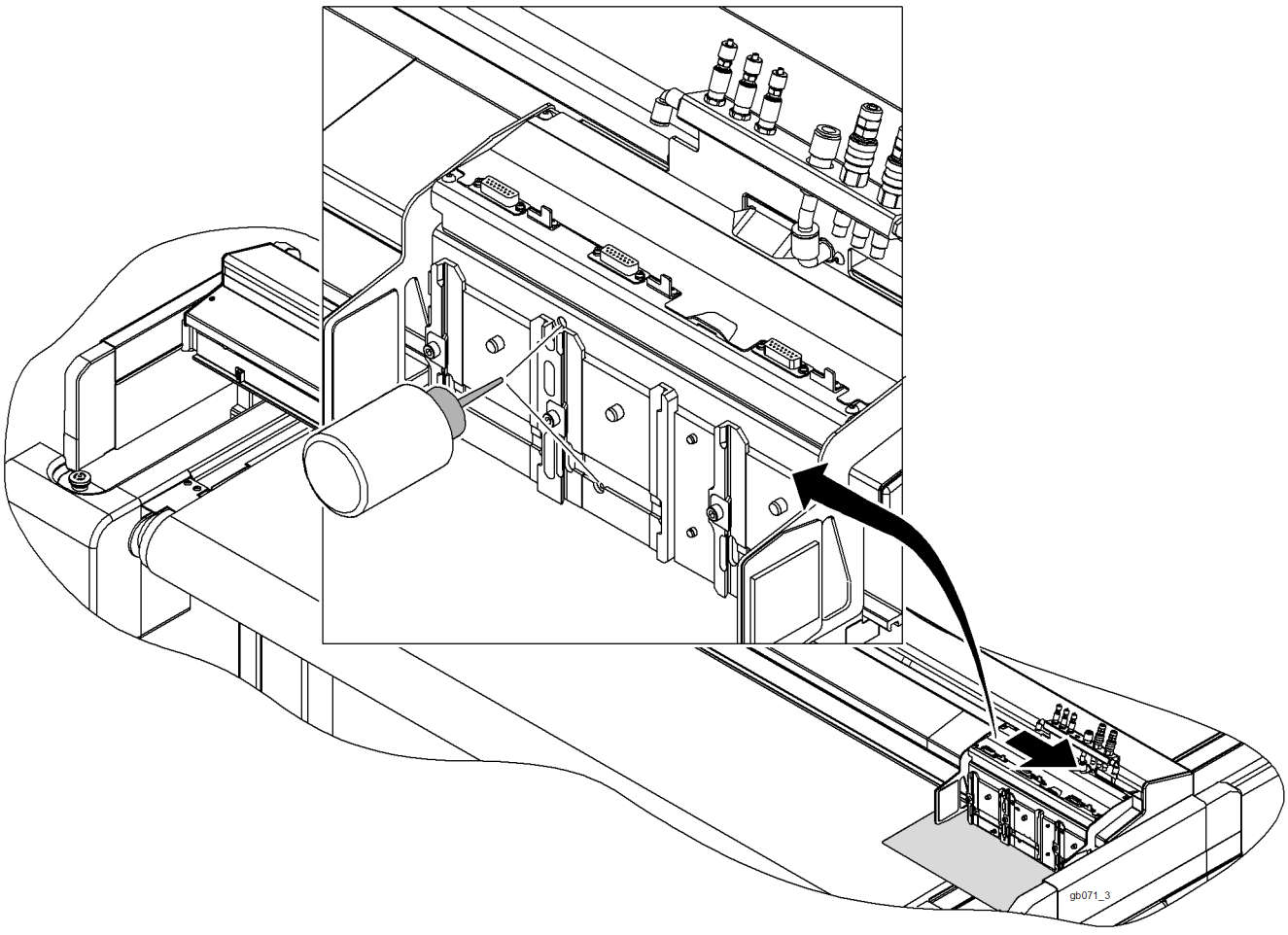

Fig. 7-11 Lubricate bearing

- ⇨ Push the module carriage to the right until it stops
- ⇨ Place a cardboard base or drip tray under the module
- ⇨ Use the oiler to apply a drop of oil to the lubrication points
- ⇨ Use a lint-free cloth to remove excess oil from the module carriage

7.7.9 Clean the chipping protection brush

Ensure, that following precondition is fulfilled:

❑ The machine is in the maintenance position.

Cleaning the brush

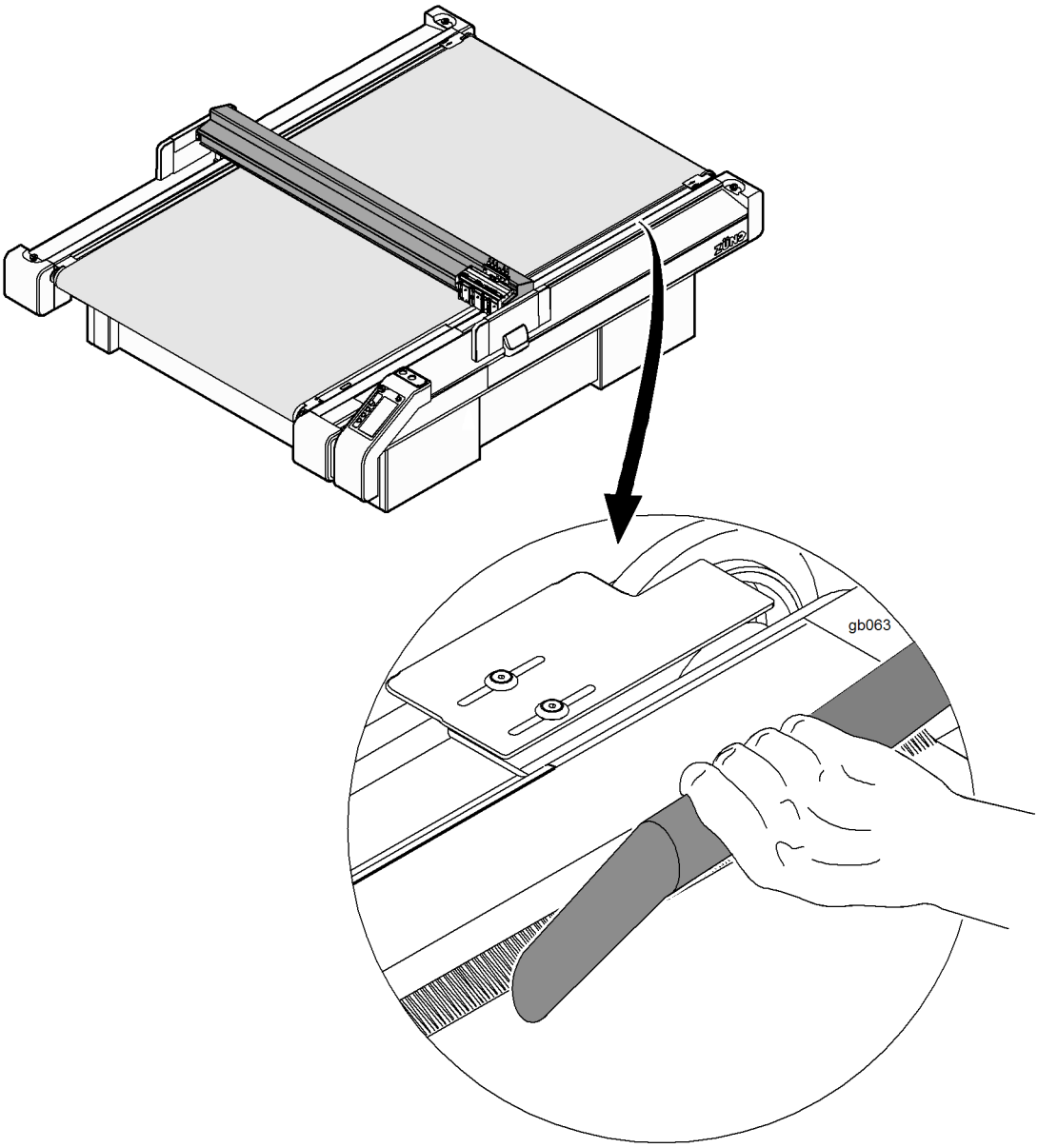

Fig. 7-12 Clean the chipping protection brush

⇨ Use a vacuum clean to extract chips and dust from the brushes

7.7.10 Cleaning the feeding clamps/feed guide rail

Tools and materials

- Lint-free cloth
- Spirit

Ensure, that following precondition is fulfilled:

❑ The machine is in the maintenance position.

Procedure

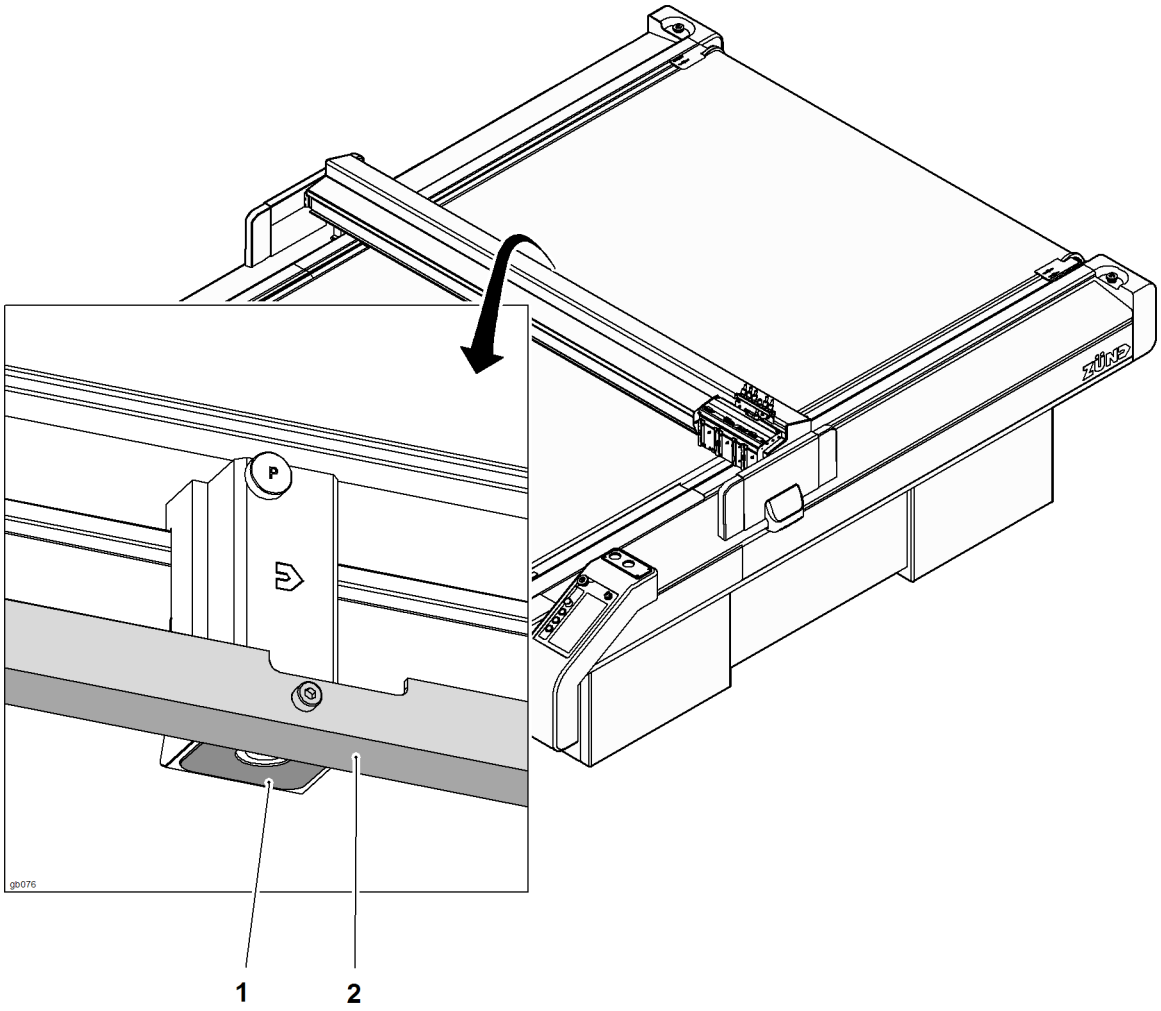

Fig. 7-13 Cleaning the feeding clamps/feed guide rail

⇨ Clean the feeding clamps/feed guide rail with a lint-free rag and spirit

7.7.11 Draining the maintenance unit condensation water

Tools and materials

- Container

Ensure, that following precondition is fulfilled:

- ❑ The machine is switched off.

Procedure

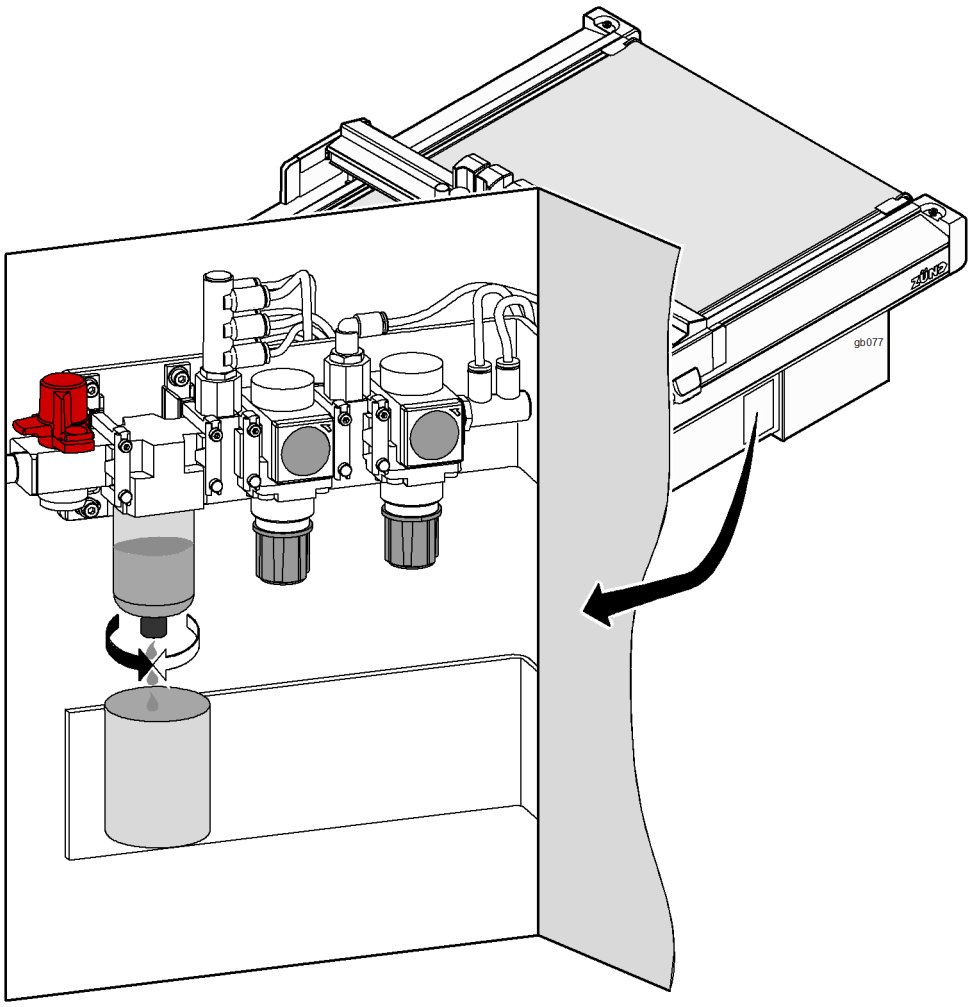

Fig. 7-14 Drain condensation water

Disposal !

The condensation liquid from the water separator is contaminated with oil. Therefore the liquid must be disposed of correctly according to the specific national regulations.

- ⇨ Set the main switch of the maintenance unit to Off
- ⇨ Hold a container under the drain
- ⇨ Open the drain screw
- ⇨ Allow the liquid to drip into the container and shut the drain screw

7.7.12 Automatic circuit breakers

Attention !

Danger of injury by electric shock

Hazardous voltage in the power unit

- Do not remove the power box cover under any circumstances.
- Contact your service partner if you have any problems with the energy supply.

Attention !

Danger of machine damage

If an automatic circuit breaker has been triggered then there is an electrical defect in a consumer.

- Remove the consumers which are secured by the circuit breaker that triggered from the stated list and allow them to be checked by authorised specialist personnel.
- Never start up damaged machines.

Remove the cover

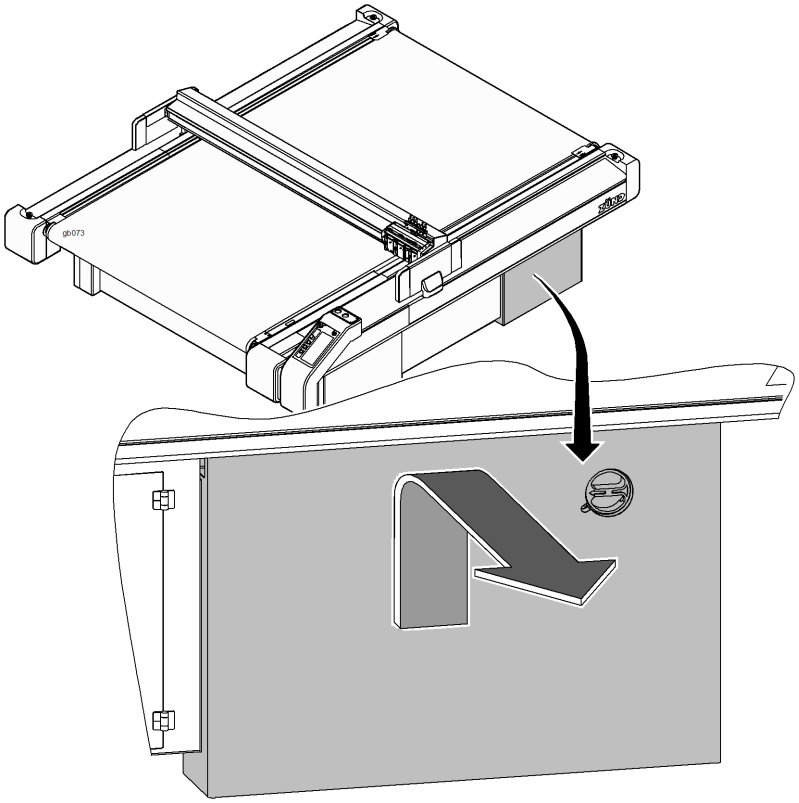

Fig. 7-15 Remove the cover

⇨ Lift the cover and remove from the guide

Automatic circuit breakers

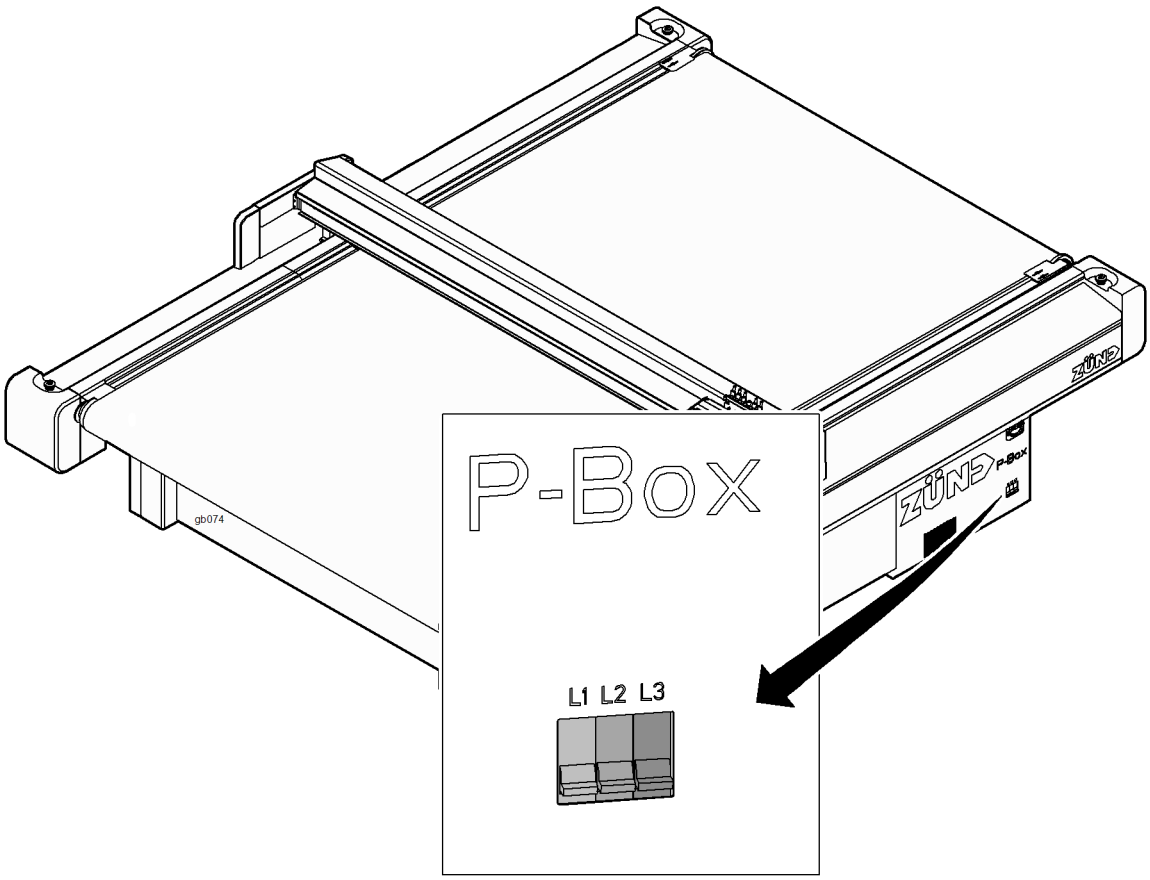

Fig. 7-16 Automatic circuit breakers

Fuse	Consumer
L1	Cutter control, compressor, PC
L2	Vacuum cleaner, various options
L3	Auxiliary drive, router converter

Important !

Maximum current: 16 A/phase

7.7.13 Conveyor belt

Tools and materials

- Conveyor belt
- Stapler with suitable staples (6 mm)
- Applicator gun
- 2 component adhesive (cartridge)
- Spatula
- Masking tape (2 cm wide)
- Gaffer tape
- Industrial scissors

Ensure, that following precondition is fulfilled:

❑ The machine is switched off.

7.7.13.1 Removing the conveyor belt

Undoing the tensioning screws

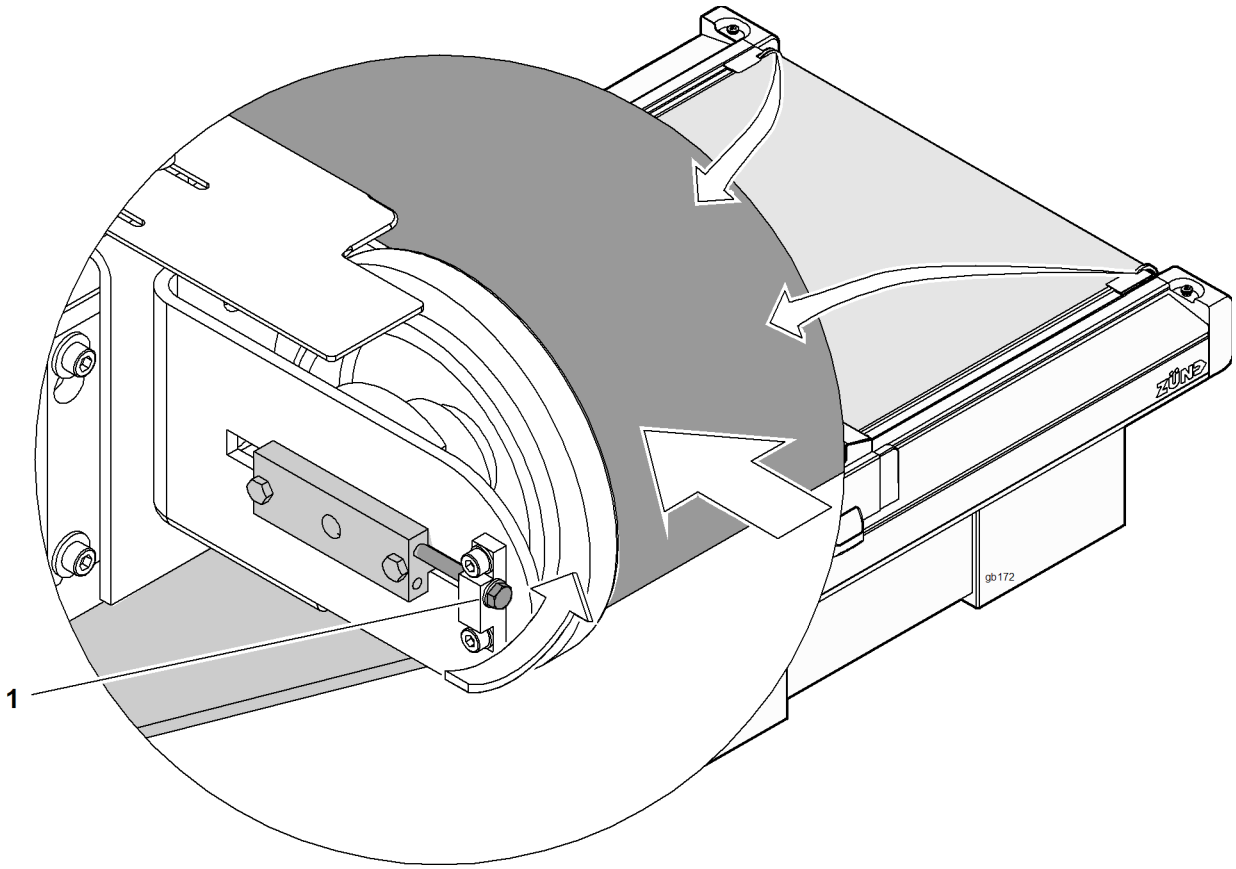

Fig. 7-17 Undoing the tensioning screws

1 Left/right tensioning screws

⇨ Undo the tensioning screws on both sides

Removing the conveyor belt

⇨ Cut the conveyor belt using **scissors** and remove it

⇨ Dispose of the conveyor belt correctly

7.7.13.2 Remove the covers

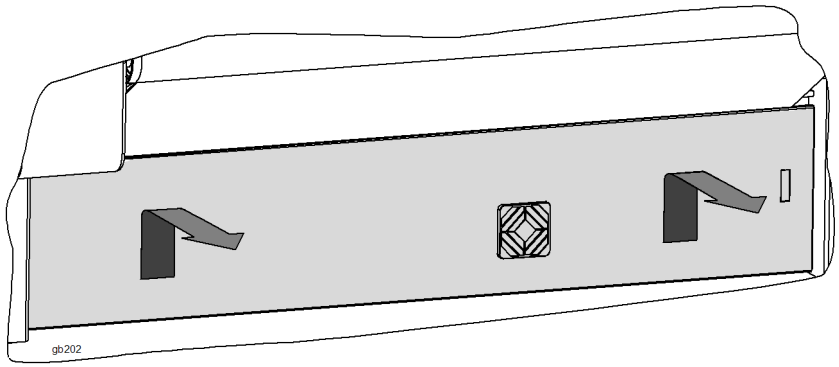

Fig. 7-18 Remove the covers

⇨ Lift the covers (1 x front, 1 x rear) and remove from the guide

7.7.13.3 Fitting a conveyor belt

Important !

Conveyor belt installation is dependent on the direction of movement. Pay attention to the marks on the belt and ensure that the belt is fitted correctly.

Determining conveyor direction

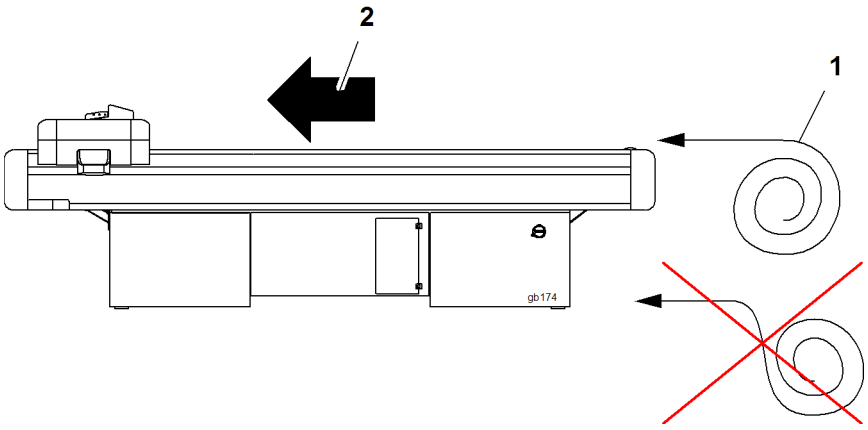

Fig. 7-19 Determining conveyor direction

1 Conveyor belt roll

2 Conveyor direction

⇨ Unroll the conveyor belt as shown in Fig. 7-19. A stamp is located on the front upper side. The points in the feed direction.

Feeding through the conveyor belt

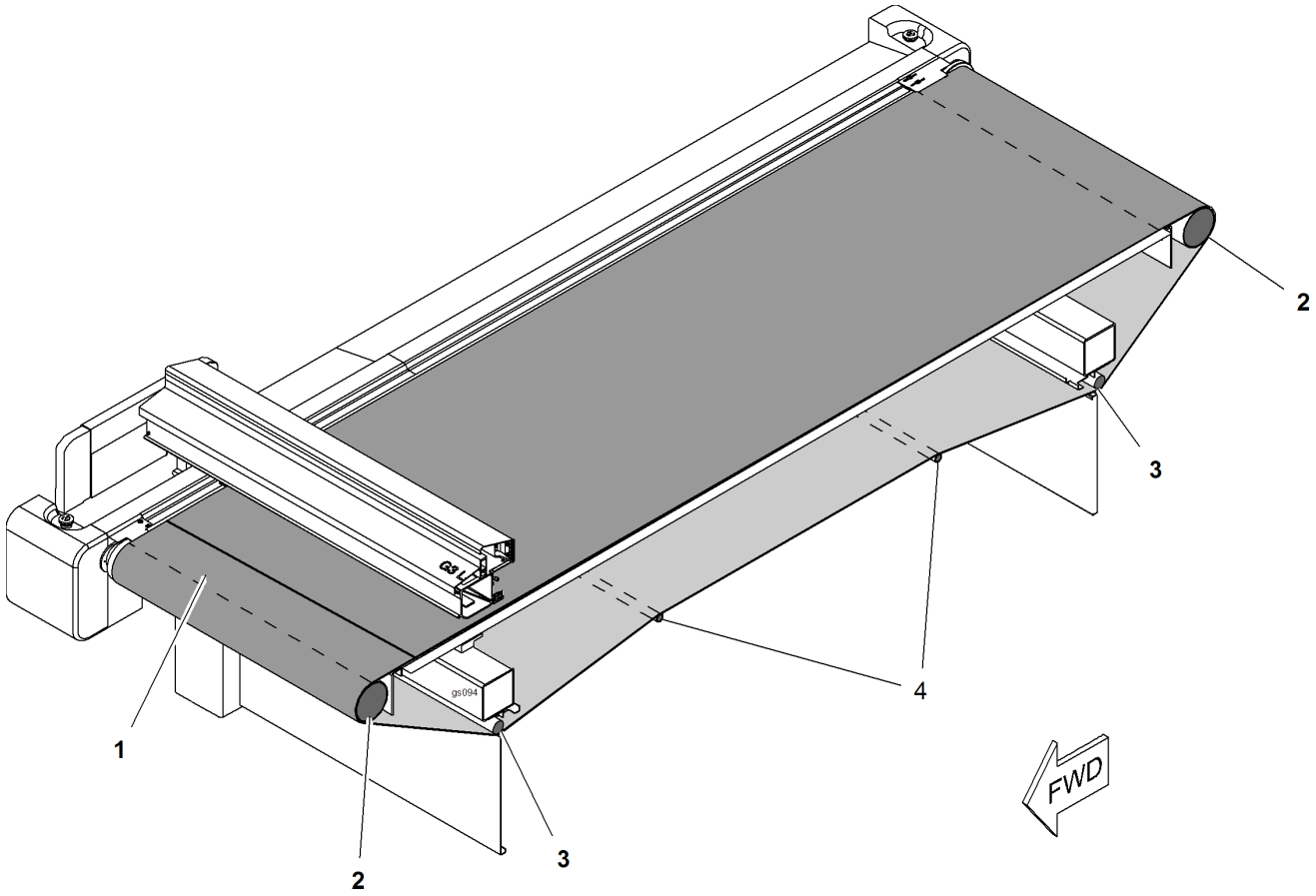

Fig. 7-20 Feeding through the conveyor belt

1	Conveyor belt	**3**	Guide rollers
2	Guide rollers, front, rear	**4**	Guide rollers

Important !

Turn on the vacuum when feeding through the conveyor belt to prevent it slipping.

⇨ Feed through the conveyor belt as shown in Fig. 7-20.

Gluing the conveyor belt

Attention !

toxic fumes

- Do not breath in glue fumes
- Only use glue in well ventilated rooms

Attention !

Skin bonding or being irritated by glue

- Do not allow glue to come into contact with skin
- Do not ingest glue or allow to come into contact with mucous membranes

Use chemical-proof protective gloves when gluing the conveyor belt.

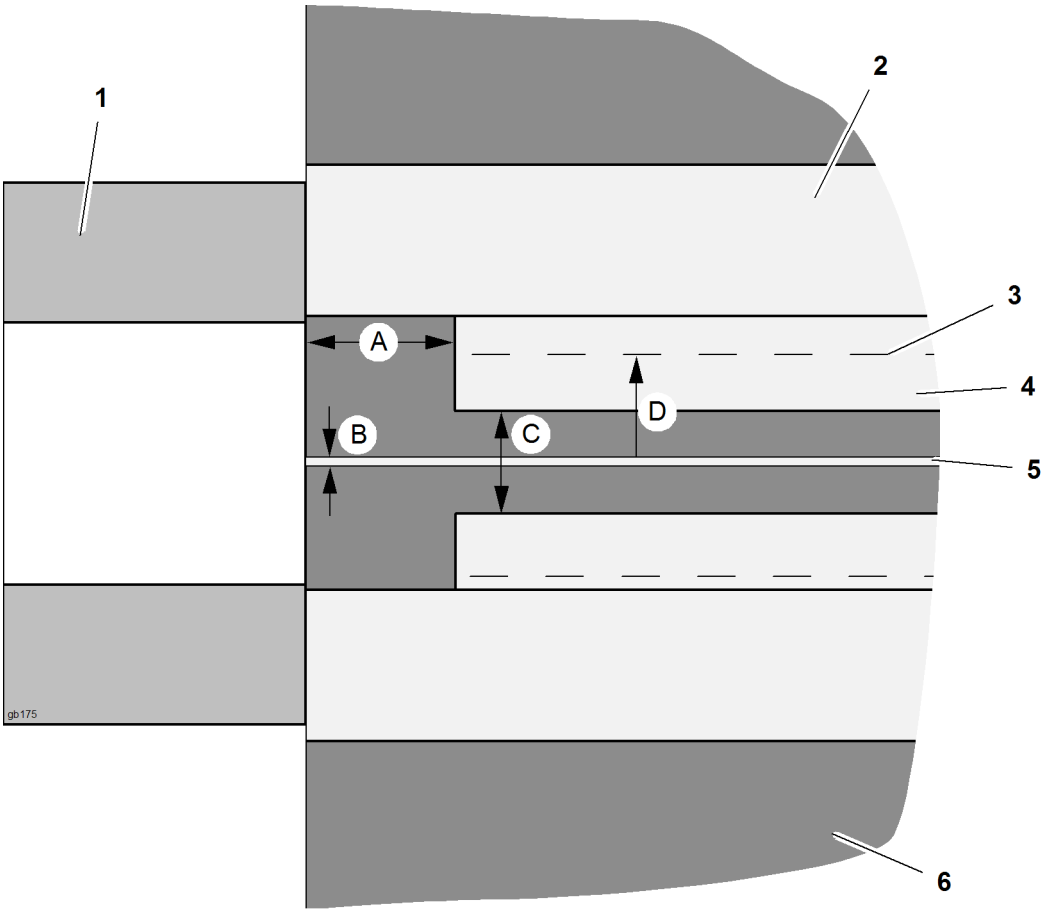

Fig. 7-21 Overview - gluing the conveyor belt

1	Assembly base		
2	Masking tape, layer 1	**A**	25 mm
3	Staples	**B**	0.5 mm
4	Masking tape, layer 2	**C**	10 mm
5	Gap	**D**	15 mm
6	Conveyor belt		

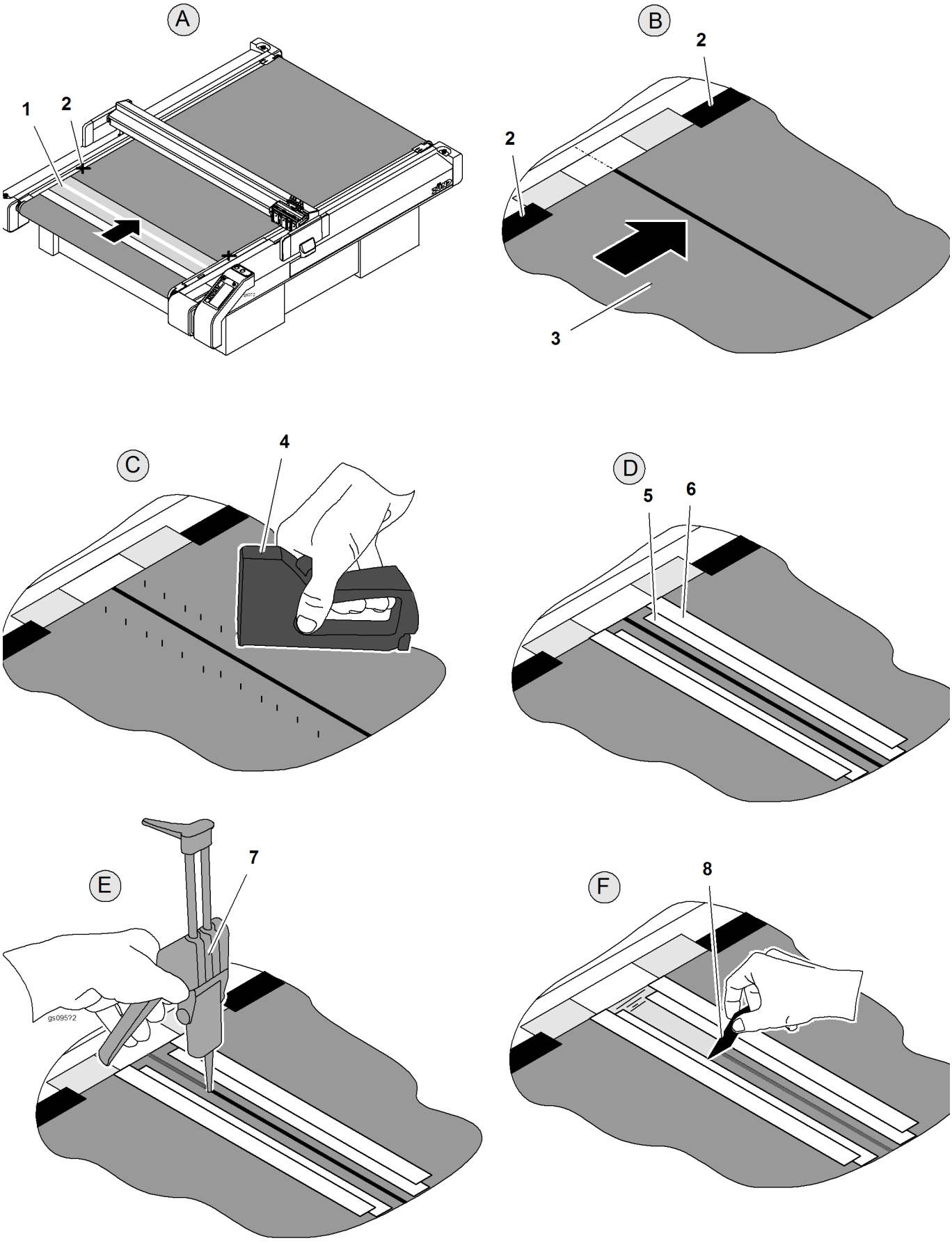

Fig. 7-22 Gluing the conveyor belt

1 Assembly base
2 Adhesive tape
3 Conveyor belt
4 Stapler
5 Masking tape, layer 1
6 Masking tape, layer 2
7 Applicator gun with 2-component glue
8 Spatula

⇨ Set up the conveyor belt straight and fix in place with adhesive tape. If necessary, turn on the vacuum to prevent the conveyor belt slipping. Push the assembly base under the fixed conveyor belt. (A)

⇨ Align the other end of the conveyor belt **parallel** to the fixed edge with a gap of approx. 0.5 mm. Fix in place with adhesive tape. (B)

⇨ Fix the aligned conveyor belt to the assembly base using the stapler and 6 mm staples (C)

⇨ Place two offset layers of adhesive tape on both sides of the connecting gap (D)

⇨ Before gluing, apply a stripe of the glue from the applicator gun to a piece of paper. This ensures that the glue which is emitted is correctly mixed. Use the applicator gun to apply the 2-component glue to the connecting gap. Ensure that the gap is completely filled with glue. (E)

⇨ As soon as the glue has been applied, use a spatula to spread out/remove the excess glue. The glue needs around 5 minutes to bond. (F)

⇨ Apply the glue more liberally to the left and right edges to prevent tearing (F)

⇨ The glue will be dry after approx. 4 hours. Remove all staples, the adhesive tape and the assembly base

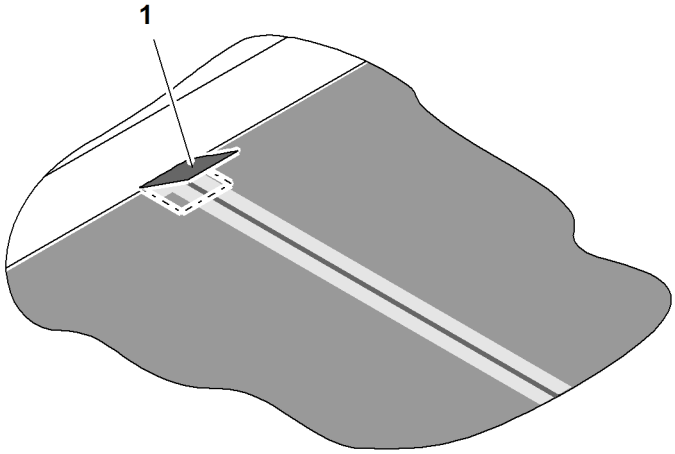

Fig. 7-23 Reinforcing the edges

⇨ Reinforce the left and right edges using gaffer tape (Fig. 7-23, item 1) to prevent the conveyor belt from tearing

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Tensioning the conveyor belt

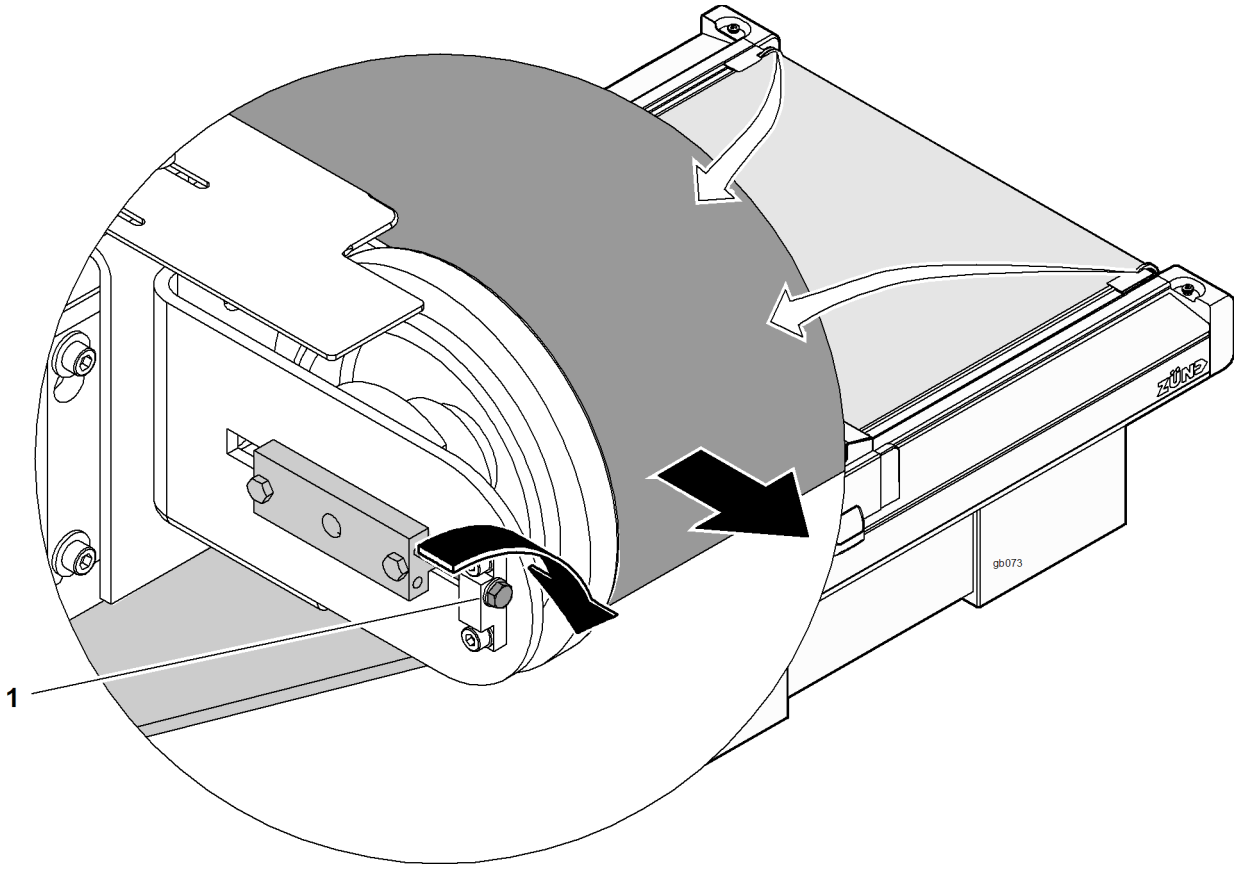

Fig. 7-24 Tensioning the conveyor belt

1 Left/right tensioning screws

⇨ Tighten tensioning screws

✓ The conveyor belt is tensioned

⇨ Repeat the procedure on the other side

Aligning the conveyor belt run

⇨ In the menu, set the conveyor belt run to 10 m (Length *1-7-2-1*)

⇨ Start an automatic belt feed (Feeding options *1-7-1-1*)

⇨ Adjust the conveyor belt run using the tensioning screws if necessary

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7.8 Instructions for disposal

Important !

Contact Zünd customer services or your service partner before you dispose of your cutter.

Zünd cutters are modern industrial devices which correspond with the current standards and guidelines on the disposal of old appliances.

- Plastic components > 20 grams are labelled and can therefore be disposed of correctly.
- Steel and plate parts have been varnished with environmentally-friendly varnish or have been powder-coated. Aluminium components have been anodised. They can be disposed of as waste metal.
- PCBs have been soldered with lead-free solder and be disposed of as electric waste.

You must also observe the following:

- Country-specific legislation and regulations on waste disposal.
- No special measures are generally required when decommissioning the cutter system because no poisonous substances are used.
- Assign a disposal company to remove and recycle the machine correctly.

7.9 Starting up after periods at a standstill

Important !

Before extended periods of downtime/for commissioning of your cutter after periods at a standstill, contact the Zünd Customer Service department or your service partner.

In general, the machine can be started up immediately, even after prolonged periods at a standstill. Some options, however, require running-in routines, which must be respected in order to ensure further maintenance-free operation.

7.9.1 Vacuum generator 1-9 KW/1-15 KW

Running-in routine after periods at a standstill > 6 days:

⇨ Activate all vacuum zones

⇨ Run in the vacuum unit for approx. 4 minutes at level 1

⇨ followed by approx. 4 minutes at level 2

✓ The vacuum generator is ready for operation

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8 Tools

000005,03,12-2008, jmu

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9 Modules

000004,03,12-2008, jmu

000004,03,12-2008, jmu

10 Options

000007,03,12-2008, jmu

000007,03,12-2008, jmu

11 Material handling

000006,03,12-2008, jmu

000006,03,12-2008, jmu

12 Additional specifications

000008,03,12-2008, jmu

000008,03,12-2008, jmu

13 Documents

000029,02,12-2008, jmu

000029,02,12-2008, jmu

14 Glossary

User level

The menu has a hierarchical division into user levels. Each user level can be activated by entering a password.

Operating status ONLINE

Jobs are processed in this operating status.

Operating status OFFLINE

In this operating status, data are received but not processed. In this operating status it is possible to use remote controlled commands to switch to the operating status ONLINE.

Operating status STOPPED

No data are received in this operating status.

Cursor

Entry marker in the editor for the purpose of entering text or figures.

Display

The display field of the operating unit.

DOCUTOOL

The DOCUTOOL gives a graphic representation of the menu tree. There is a help section that can be clicked for each menu entry. System requirements: Intel Pentium 2, activated Java Script

Travel keys

Move the module carriage in the OFFLINE mode. Simultaneously pressing the SHIFT key increases the movement speed.

Function keys

These keys F1 - F8 can be defined by the user. Menu entries are assigned to these keys

HP-GL

Hewlett Packard Graphic Language (HP-GL) is a programming language developed by Hewlett-Packard for controlling plotters.

Initialisation

After the cutter is started, key F1 is used to initialise the X/Y axis of the cutter. The absolute zero point is defined via a light barrier.

The Z axis is initialised separately for each tool.

Communication software

Front end: For example: GTK... = user software, visual display of HP-GL commands

Menu entry

Each menu entry has a uniquely assignable menu number.

Menu number

The menu is numbered consecutively and hierarchically.

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Modules

Modules serve as the interface between the cutter and the tool.

Emergency stop

Emergency stop switches are safety elements which cause the immediate switching off of the machine in hazardous situations.

Numerical keys

Keys for making numerical entries on the operating unit.

Parser

Program that can break down any input and convert it into a format that can be used for further processing.

Popup

Window that is released by the menu.

Shift key

The shift key on the operating unit is used as a switch for short-term switching of the keyboard to the second assignment level with special functions.

Soft keys

These special keys change their function depending on the situation and ease operation.

Standby

The cutter is switched on but not initialised. The initialisation is started via the F1 key.

Stop

A stop is triggered by pressing the movement keys in the ONLINE operating status. In this process all cutter movements are stopped and the OFFLINE operating status is activated.

Feeding clamps

Feeding clamps fix the processing material during a feed movement on the conveyor belt.

Tool

Tools are used in modules. There are tools available for processing many common materials. (E.g. EOT, POT, DRT etc.)

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